The Role of Social Problem-Solving in Chronic Prostatitis/Chronic Pelvic Pain Syndrome:

Predicting Physical Symptoms in the Context of Daily and Perceived Life Stress

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Abstract

The Role of Social Problem-Solving in Chronic Prostatitis/Chronic Pelvic Pain Syndrome: Predicting Physical Symptoms in the Context of Daily and Perceived Life Stress

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Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS) is a common and persistent urological pain condition often accompanied by lower urinary tract and sexual dysfunction symptomatology, and currently of indeterminate etiology. The condition presently lacks effective and satisfactory treatment options. Studies that have explored the characteristic symptoms and ways of coping in men diagnosed with CP/CPPS report that they experience substantial physical and psychological problems, particularly in the realms of depression, anxiety, quality of life, perceived stress, physiological stress reactivity, and pain catastrophizing. These documented biopsychosocial correlates of CP/CPPS have demonstrated significant associations with the symptomatology associated with chronic prostatitis syndromes, such as pain intensity and pain-related disability (Ullrich, Turner, Ciol, & Berger, 2005). Recent advancements aimed at improving both understanding and intervention of chronic pelvic pain syndrome have focused on psychoemotional and psychosocial facets of the development, course, and prognosis of the disorder.

Social problem-solving (SPS) refers to the dynamic interplay between the affective, cognitive, and behavioral aspects of real-world problem-solving (Nezu, Nezu, & D'Zurilla, 2013). Despite evidence for the role of SPS in various adjustment outcomes of other chronic pain populations, including patients coping with migraine/tension headaches, back pain, and noncardiac chest pain, this construct has yet to be formally assessed in the CP/CPPS population

(Eskin, Akyol, Celik, & Gultekin, 2013; Siemonsma, Stuive, Roorda, Vollebregt, Lankhorst, & Lettinga, 2011; Nezu, Nezu, Jain, Shepanski Xanthopoulos, Cos, Friedman, & Lee, 2007; Nezu, Maguth Nezu, & Jain, 2008). As a result, the present study examined the significance of correlations between social problem-solving (measured by the Social Problem Solving Inventory-Revised; SPSI-R), chronic prostatitis symptomatology (reported on the National Institutes of Health – Chronic Prostatitis Symptom Inventory; NIH-CPSI), the experience of daily life stress (reported on the Survey of Recent Life Experiences Scale; SRLE) and perceived stress (measured by the Perceived Stress Scale; PSS), in males diagnosed with CP/CPPS. Additionally, this investigation conducted a hierarchical multiple regression in order to assess the utility of SPS in predicting CP/CPPS symptoms, while accounting for daily life hassles and perceived stress, respectively. Finally, the potential moderating function of SPS in the relationship between daily life stress experiences and CP/CPPS symptoms and between perceived stress and CP/CPPS symptoms was explored. Significant results regarding the two distinct stress measures, the SRLE and PSS, were compared for any notable, differential associations with the variables of interest that might suggest the unique contribution of these constructs to CP/CPPS.

As hypothesized, total SPS was found to be significantly associated with total CP/CPPS symptomatology on the NIH-CPSI. Additionally, SPS significantly predicted symptoms above and beyond the experience of perceived stress on the PSS, but not the experience of daily stress on the SRLE. Finally, no support was found for the hypothesis that SPS would be a significant moderator of the stress – symptom relationship for either the perception or experience of stress. However, data collection remains ongoing. In the event that the final results of this investigation highlight SPS as a promising target of treatment intervention in alleviating the symptomatology of males diagnosed with chronic pelvic pain, future research will focus on the

implementation and efficacy of Problem-Solving Therapy (PST) for CP/CPPS as a viable avenue of psychosocial treatment.

CHAPTER 1: INTRODUCTION

Nonbacterial Chronic Prostatitis (CP), also referred to as Chronic Pelvic Pain Syndrome (CPPS), is a common urological condition in males characterized by the hallmark symptom of persistent pain and discomfort in the pelvic region for a duration of at least three consecutive months. CP/CPPS constitutes Category III of the four classifications of prostatitis syndromes currently defined by the U.S. National Institutes of Health (NIH), and includes two subtypes of the disorder – inflammatory (Category IIIA) and non-inflammatory (Category IIIB). Diagnoses described by Category III are 8 times more common than chronic bacterial prostatitis (Category II), with nonbacterial forms of prostatitis accounting for greater than 90% of all cases (Sherbourne & Stewart, 1991; Pontari, 2003).

Pain in CP/CPPS can occur at a variety of sites, including the suprapubic region, penis, testes, perineum, inner thighs and lower back. Oftentimes, men with this disorder report pain in more than one of these locations. Though not required for the diagnosis of CP/CPPS, the condition is typically accompanied by a constellation of lower urinary tract and sexual dysfunction symptomatology, as well as a negative impact on the patient's perceived physical and psychological quality of life. Lower urinary symptoms occurring in CP/CPPS may include frequency, urgency, and nocturia, while sexual dysfunction encompasses erectile dysfunction, premature ejaculation, painful intercourse, and decreased sexual desire and activity (Aubin, Berget, Heiman, & Ciol, 2008; Mehik, Hellstrom, Sarpola, Lukkarinen, & Jarvelin, 2001).

CP/CPPS may develop at virtually any age, with the condition's prevalence estimated at 16% in adult North American samples, 14% in adult Asian and European samples, and 8% in adolescent North Americans (Tripp, Nickel, Koljuskov, Shoskes, Pontari, Litwin, & McNaughton-Collins, 2013; Tripp, Nickel, Ross, Mullins, & Stechyson, 2008). Indeed, this diagnosis is

responsible for 8 million outpatient visits annually worldwide, 2 million of which occur in the United States alone, and has been reported as the primary reason men under the age of 50 visit a urologist (Berger, Foster, Kaufman, Meacham, Nickel, Peters, Rosenberg, & Teichman, 2005; Pontari, 2003; McBryde & Redington, 2002). As such, CP/CPPS is alarmingly common, dictating the well-being of a large patient population and possessing significant implications for healthcare costs.

Unfortunately, the true etiology of CP/CPPS remains elusive, making the disorder particularly difficult to treat efficiently and effectively. Current biomedical treatment options are typified by pharmacotherapy, with a course of antimicrobial, α-adrenergic antagonist, anti-inflammatory, anticholinergic, and/or antidepressant medications prescribed. In some cases, surgical interventions such as transurethral resection of the prostate (TURP), a procedure designed to remove all or part of the prostate gland, are recommended. While urologists may be successful in alleviating some of the symptoms associated with CP/CPPS, no cure for the unidentified pathology behind these symptoms currently exists. As a result, patients coping with this chronic pain condition frequently experience frustration surrounding the uncertainty of the cause of their discomfort and dissatisfaction with the limited scope of available treatments.

Biopsychosocial Correlates of Chronic Prostatitis

In recent years, advancements in our understanding of the complex, multidimensional nature of nonbacterial forms of CP/CPPS have been made by investigations focused on the psychoemotional and psychosocial correlates of the disorder, illuminating the subsequent role such factors play in the course and prognosis of the syndrome. Consequently, the utility of adopting a biopsychosocial approach to the successful treatment of CP/CPPS has been increasingly recognized, laying the foundation for the implementation of psychological

interventions in this population. Though research focused on the development and application of such interventions is in its infancy, an extensive body of literature exists which has established a multitude of psychoemotional correlates in CP/CPPS that can be conceptualized as potential targets for future intervention. Indeed, elevated levels of symptoms of depression and anxiety, perceived stress and physiological stress reactivity, and engagement in pain catastrophizing, as well as significant reductions in perceived physical and mental quality of life, are well-documented in the chronic prostatitis literature. These biopsychosocial correlates strongly suggest that males coping with CP/CPPS are experiencing significant distress that can be difficult to manage in the absence of clearly efficacious, evidence-based treatment alternatives.

Stress. The adverse impact of perceived stress combined with the body's physiological reactions to stress on both physical and mental health can be debilitating, particularly for patients coping with chronic medical conditions – a chronic stressor in and of itself. The influential role of stress is especially salient in the context of CP/CPPS, so much so that Miller (1988) advocated for the term "Stress Prostatitis" in place of the syndrome's traditional title of Chronic Prostatitis. Mehik and colleagues (2001) used personality trait assessment as a proxy for stress, with results suggesting that males who described themselves as "occupied/busy" (OR = 1.93, 95% CI: 1.23 – 3.02, $p = .004$), "worried/nervous" (OR = 4.03, 95% CI: 2.53 – 6.40, $p < .001$) and/or "meticulous/pedantic" (OR = 2.76, 95% CI: 1.48 – 5.15, $p = .001$) were more likely to experience prostatitis symptoms than their self-professed "calm/peaceful" peers. Males diagnosed with CP/CPPS have not only demonstrated a propensity to perceive that they are under significant amounts of stress, but have also evidenced abnormalities in the manner in which their bodies physically respond to stressful experiences. Perceived stress and physiological stress reactivity have been correlated with increases in physical symptomatology

including greater pain intensity and pain-related disability, as well as impaired psychological adjustment, particularly in the form of depression and anxiety.

Perceived Stress. Several investigators concur that males coping with CP/CPPS generally report high levels of perceived stress that often distinguishes these patients from healthy controls (Ahn, Kim, Chung, Park, Cho, & Kim, 2012; Anderson, Orenberg, Morey, Chavez, & Chan, 2009; Anderson, Orenberg, Chan, Morey, & Flores, 2008; Wallner, Clemens, & Sarma, 2009). Ahn et al. (2012) compared Korean military personnel diagnosed with CP/CPPS to a symptom-free control group on a battery of physical and psychological adjustment variables including perceived stress, as measured by the Global Assessment of Recent Stress scale (GARS). Men with CP/CPPS reported significantly greater perceptions of total stress over the past week as indicated by summed scores on the GARS (M_{GARS} = 23.87, *SD* = 13.19) when compared to their healthy counterparts (M_{GARS} = 9.29, *SD* = 11.24, $p < .001$) (Ahn et al., 2012). In addition, the CP/CPPS patient group evidenced significantly higher endorsement of all eight sub dimensions of stressors assessed by the GARS: work/job/school, interpersonal, relationship changes, sickness/injury, financial, unusual happenings, change in routine, and overall global stress ($p < .01$). Ahn and colleagues also noted that total GARS scores were positively correlated with symptomatology of the CP/CPPS sample, suggesting that the more stress a patient perceives the greater the pain they experience and the poorer their quality of life.

Interestingly, though patients in Ahn et al.'s (2012) investigation overwhelmingly reported elevated levels of perceived stress, Ahn and colleagues found no significant difference between the number of positive, neutral, or negative stressors experienced by males with CP/CPPS and healthy controls over the past year on the Social Readjustment Rating Scale. These findings suggest that while those diagnosed with CP/CPPS do not necessarily experience

stressors more frequently than pain-free individuals, males with CP/CPPS tend to *perceive* that they are experiencing greater degrees of stress. Perhaps patients coping with chronic pain conditions like CP/CPPS develop a maladaptive, psychological sensitivity and reactivity to the experience of stressors in general that could account for these elevations in stress perception.

In a series of investigations combining both self-report and physiological measures of stress, Anderson et al. (2008) and Anderson et al. (2009) utilized the Perceived Stress Scale (PSS) to assess this construct in two samples of CP/CPPS patients and healthy controls matched on age. Results of Anderson and colleagues (2008; 2009) were similar to those of Ahn et al. (2012), indicating that males diagnosed with CP/CPPS endorsed significantly more perceived stress on the PSS (Median $_{PSS}$ = 19; Median $_{PSS}$ = 19) than pain-free males (Median $_{PSS}$ = 12, $p < .001$; Median $_{PSS}$ = 14, $p = .0025$). Though Anderson et al. (2008; 2009) did not report on additional, direct relationships between perceived stress and other variables of interest measured in these studies, the CP/CPPS patient samples also endorsed significantly higher levels of anxiety on the Beck Anxiety Inventory (BAI) and greater psychological distress on the Brief Symptom Inventory (BSI) than their asymptomatic counterparts (Anderson et al., 2008; Anderson et al., 2009). Median psychosocial distress, as measured by the Global Severity Index (GSI) of the BSI, fell into the 94th percentile for males diagnosed with CP/CPPS versus the 47th percentile for pain-free males ($p < .0001$) (Anderson et al, 2008). Specifically, the magnitude of the distinction between patient and control cohorts was greatest on BSI dimensions of somatization, depression, psychoticism, and phobic anxiety (Anderson et al., 2009).

Aubin et al. (2008) like Anderson and colleagues (2008; 2009) analyzed perceived stress as measured by the PSS in a CP/CPPS patient cohort, along with a variety of additional psychological and sexual factors. Greater than half of the men diagnosed with CP/CPPS in Aubin

et al.'s (2008) study indicated their belief in the notion that stress worsened their pain, with the patient cohort reporting a mean PSS score of 22.3 (*SD* = 8.8). Unfortunately, though this investigation incorporated a pain-free control group for comparison, the PSS was not administered to the healthy cohort. As a result, Aubin et al. (2008) compared the mean obtained in the CP/CPPS sample to the "normative sample" mean of the PSS, a reported value of 22.4. Based on this information, Aubin et al. (2008) suggest that the patient sample is comparable to the norm on levels of perceived stress, contrary to the conclusions of Ahn et al. (2012) and Anderson et al. (2008; 2009). The normative sample Aubin and colleagues refer to consists exclusively of young male college students and is unlikely to be an accurate representation of the mean PSS score that would have been obtained had this measure been administered to the pain-free control group of similar demographic composition to the patient cohort. The question remains unanswered as to whether or not Aubin et al. (2008) would have obtained results consistent with the studies previously described had they utilized a more appropriate comparison group.

In an effort to assess risk and protective factors for the development of prostatitis in African American males, Wallner, Clemens, and Sarma (2009) conducted interviews and administered the PSS to participants in the Flint Men's Health Study. After adjusting for age, males who endorsed high levels of perceived stress on the PSS, which included 51.1% of the prostatitis cohort versus only 33.4% of the healthy cohort, were significantly more likely to have a history of prostatitis (OR = 2.27, 95% CI: 1.24-4.13) (Wallner, Clemens, & Sarma, 2009). However, contrary to the findings of Ahn et al. (2012), Wallner and colleagues reported that men with a history of prostatitis also experienced significantly more stressful life events than males with no history of the diagnosis when controlling for age (OR = 1.39, 95% CI: 1.07-1.82). Additional risk factors that emerged in Wallner et al.'s (2009) study included poor self-reported

ratings of physical health (OR = 2.80, 95% CI: 1.09-7.22) and emotional health, as well as reduced frequency of sexual activity. However, emotional health (OR = 1.68, 95% CI: 0.84 – 3.37) and sexual activity (OR = 0.61, 95% CI: 0.22 – 1.72) were no longer significant risks for prostatitis after age adjustment (Wallner et al., 2009). Protective factors were characterized by high levels of social support (OR = 0.56, 95% CI: 0.31 – 1.04) and physical activity (OR = 0.33, 95% CI: 0.13 – 0.88) (Wallner et al., 2009).

The vast majority of research detailing perceived stress in CP/CPPS patient samples is cross-sectional in nature, prohibiting inferences about the direction of the relationship between this construct and the course and prognosis of prostatitis syndromes. Indeed, based on the available evidence cited above, it could be argued that the tendency to perceive high levels of stress is either a precursor to the development and exacerbation of this chronic pain condition or the result of coping with the diagnosis on a daily basis. Ullrich et al. (2005) conducted a longitudinal study of perceived stress (4-item PSS), pain intensity, pain-related disability and psychological distress across four time points – baseline, three, six, and twelve months after initial diagnosis of nonbacterial prostatitis. Results indicated that perceived stress level averaged across the first six months following diagnosis significantly predicted greater pain intensity (p = .03) and pain-related disability (p = .003) at twelve month follow-up, controlling for age, symptom duration at baseline, and the respective outcome variable over the first six months. Specifically, Ullrich et al. (2005) reported that for each one point increase in averaged perceived stress scores, patients were 0.88 times less likely to experience reduced pain intensity and 0.82 times less likely to experience reduced pain-related disability one year post CP/CPPS diagnosis. Analyses predicting the same two outcomes over shorter time intervals (i.e. baseline to three months and baseline to six months) were consistent with the models predicting pain intensity

and pain-related disability at twelve months and evidenced stronger associations between perceived stress and physical adjustment.

Notably, Ullrich and colleagues state that their patient sample did not endorse particularly elevated levels of perceived stress overall (M_{PSS} = 3.4, *SD* = 2.9) compared to a normative sample (M_{PSS}= 4.2, *SD* = 2.8) which may also be partially attributed to the primarily Caucasian, high income, and well-educated demographic characteristics of the sample. These investigators posit that in samples with greater perceived stress and physical symptomatology at baseline, subsequent predictions of physical adjustment would likely be enhanced. Ultimately, Ullrich et al. (2005) conclude: "The results suggest the potential fruitfulness of further research investigating the role of stress in nonbacterial prostatitis/pelvic pain, underlying mechanisms, and the efficacy of interventions that incorporate stress management techniques" (p. 116).

Physiological Stress Reactivity. Clark and Treichler (1950) were among the first researchers to provide evidence for the prostate mind-body connection, as measured by prostatic secretion rate of the enzyme acid phosphatase (AP) during a scenario designed to induce "psychic stimulation" in both a laboratory and real-world setting. Male and female subjects provided urine samples before, during, and after viewing sexual and nonsexual (control) movie clips designed to elicit psychosexual stress, or feelings of sexual arousal. With the exception of one individual, all male participants demonstrated an increase in prostatic AP secretion in response to the sexual versus neutral stimuli presented, with no significant response found in female participants as predicted. In an effort to determine if prostatic secretion was unique to psychosexual stimulation or generalizable to other emotional contexts, Clark and Treichler (1950) analyzed AP concentration in urine samples of two actors preceding an onstage performance as well as at two time points afterwards and obtained results similar to

those derived from the laboratory manipulation. Clark and Treichler (1950) emphasize, "The results conform with the assumption that the prostate responds to emotional stimuli through the autonomic nervous system" (p. 263). These findings suggest that even at such an early stage of research examining prostatic responses, the influence of psychoemotional variables on physiological functioning was considered.

Modern investigations of stress reactivity in males with chronic prostatitis have been conducted by Anderson and colleagues (2008; 2009), with an emphasis on cortisol and Adrenocorticotropic Hormone (ACTH) secretion and the implementation of more sophisticated laboratory stressor tasks. The Trier Social Stress Test (TSST), which is comprised of a public speaking and mental arithmetic task performed before an evaluation panel, was employed by Anderson et al. (2009) in order induce an acute state of moderate stress in participants. Blood and saliva samples were collected at various intervals before, during, and after the TSST and were assessed for concentrations of ACTH and cortisol, two hormones associated with autonomic arousal and secreted during activation of the Hypothalamic-Pituitary-Adrenal (HPA) axis response to stress (Anderson et al., 2009).

Anderson et al. (2009) demonstrated that men with CP/CPPS evidenced lower ACTH production at baseline ($M_{[ACTH]}$ = 38.9 pg/ml, *SEM* = 3.3) and a significantly smaller magnitude of change in ACTH secretion from baseline to peak during the TSST ($M_{\Delta[ATCH]}$ = 3.38 pg/ml, *SEM* = 1.1) versus healthy males ($M_{[ACTH]}$ = 52.2 pg/ml, *SEM* = . 7.9, *p* = .047; $M_{\Delta[ATCH]}$ = 8.58 pg/ml, *SEM* = 2.8, *p* = .043). This investigation suggests that men with CP/CPPS exhibited a blunted ACTH response curve ($M_{[ACTH]}$ = 38.9 pg/ml*h, *SEM* = 3.3) that was reduced by 30% compared to the ACTH response curves of healthy controls ($M_{[ACTH]}$= 53.4 pg/ml*h, *SEM* = 7.8, *p* = .038). However, no significant differences in serum or salivary cortisol responses were observed

between the patient and control groups, contrary to the findings of Anderson et al. (2008) (Anderson et al., 2009).

In their 2008 study, Anderson and colleagues had both CP/CPPS patients and age matched, pain-free controls collect salivary cortisol samples at nine, precisely scheduled intervals each day for two consecutive days in order to track patterns of awakening cortisol responses and slope of daytime cortisol activity. Results suggested that the CP/CPPS cohort possessed significantly greater awakening cortisol responses, such that the increase in cortisol level from waking to peak thirty minutes later was 47% (slope $_{CPPS}$ = 0.85), in contrast to a 31% increase characteristic of the control cohort (slope $_{Control}$ = 0.59, p = .05) (Anderson et al., 2008). Conversely, diurnal cortisol sloping was not distinguishable between males diagnosed with chronic pelvic pain (slope $_{CPPS}$ = -0.127) and healthy males (slope $_{Control}$ = -0.127, p > .05) (Anderson et al., 2008). Anderson and colleagues (2008; 2009) conclude that the abnormalities in ACTH and awakening cortisol functioning observed in CP/CPPS patients are evidence for a dysfunctional HPA axis. The authors propose that low baseline levels and blunted responses of ACTH may be the result of physiological habituation to the stress induced by the chronic pain experience. Such findings suggest the need for more research to better understand the complex psychosocial correlates as well as possible causal mechanisms concerning perceived stress, physiological stress reactivity, and psychological, emotional, and physical adjustment in patients with chronic prostatitis.

Coping Strategies. While it is evident that males coping with CP/CPPS are burdened by a constellation of psychological and physiological sensitivity to stressful experiences, little research has explored the array of coping strategies this particular patient population might employ in order to combat distress. With the exception of pain catastrophizing, a maladaptive

coping mechanism that has been well documented in CP/CPPS, few other insights are currently available regarding either the ways in which these patients attempt to cope or the subsequent utility of these approaches in alleviating physical and/or mental pain.

In an attempt to provide a more comprehensive snapshot of coping strategies utilized by CP/CPPS patients, Ahn et al. (2012) administered the Weisman Coping Strategy Scale and determined that gathering information (81.8% of CP/CPPS sample), redefinition or acceptance of problems and searching for effective ways of coping (74.5%), and flexibility or compromise for feasible alternatives (70.9%) were among the most commonly endorsed ways of coping. Conversely, coping strategies that were rarely endorsed by Ahn et al.'s (2012) CP/CPPS cohort included fatalism or considering problems inevitable and frustrating (21.8%), externalization or criticism of others (21.8%), and self-pity (21.8%). As a result, Ahn and colleagues posit that males diagnosed with chronic pelvic pain generally rely on adaptive, efficacious coping strategies in the face of stress. Regardless, elevated instances of perceived stress, depression, anxiety and physical symptomatology, as well as the prevalence of pain catastrophizing in CP/CPPS patients suggest the potential for improvement in the coping resources of this patient population.

Pain Catastrophizing. Sullivan et al. (2001) conceptualized the general construct of pain catastrophizing as "an exaggerated negative 'mental set' brought to bear during actual or anticipated pain experiences" (p. 53). Pain catastrophizing is comprised of three significant dimensions, and is often quantified by Sullivan et al.'s (1995) Pain Catastrophizing Scale (PCS): rumination, magnification, and helplessness. Individuals who engage in pain catastrophizing tend to experience excessive, unwanted pain-related worry and thoughts that are difficult to suppress, exaggerate the adverseness of a painful stimulus and perceive the future of the pain

experience pessimistically, and exhibit a reduced sense of self-efficacy related to their ability to cope with pain (Sullivan et al., 1995). The negative impact of pain catastrophizing on a plethora of psychophysical health-related outcomes has been demonstrated in a variety of pain-related illnesses, and is especially salient in CP/CPPS.

Social Problem-Solving as a Potential Explanatory Mechanism

The current conceptualization of social problem-solving (SPS) emphasizes the equivalence of and interplay between affective, cognitive, and behavioral factors in the process of identifying or producing adaptive methods for solving real-life problems. The construct of SPS encompasses two theoretically distinct, orthogonal dimensions – problem orientation and problem-solving style (D'Zurilla, Nezu, & Maydeu-Olivares, 2004). Problem orientation refers to a comparatively stable set of schemas that characterize both the emotional reactions and cognitive appraisals individuals exhibit in the context of a problem. Those possessing a positive problem orientation (PPO), also known as the "optimists", have a high degree of self-efficacy, tend to view problems as solvable challenges that require significant commitment, and are able to successfully tolerate aversive affective experiences, often using negative emotions to adaptively inform the coping process. Conversely, individuals with a negative problem orientation (NPO), or the "pessimists", are usually doubtful of their ability to cope with problems which are perceived as unsolvable threats associated with a host of overwhelming, negative emotions that cannot be successfully regulated. A parallel can be drawn between negative problem orientation and the construct of pain catastrophizing previously described. Oftentimes, problem orientation is dependent upon the specific type of life problem at hand, such that an individual who is an "optimist" when confronted with challenges at work may

simultaneously be considered a “pessimist” when coping with health-related threats such as a chronic illness diagnosis (Nezu, Nezu, & D’Zurilla, 2013).

Problem-solving style denotes the cognitive-behavioral actions individuals engage in to solve or manage a problematic situation, and is comprised of three approaches: planful (PPS), impulsive-careless (ICS), and avoidant (AS) problem-solving (Nezu, Nezu, & D’Zurilla, 2013). “Planful problem-solvers” mindfully and actively participate in the problem-solving process, possessing the skills necessary to concretely define the problem and its associated obstacles, generate alternatives, make a thoughtful decision, and implement the solution as well as monitor its outcomes. Impulsive-careless and avoidant problem-solving styles, on the other hand, are ineffective and often serve to exacerbate extant problems or generate new stressors. While a person who employs an impulsive/careless style of problem-solving (termed by Nezu and colleagues a “Quick Fixer”) makes attempts to solve the problem at hand, these efforts are inadequate in the sense that they are not thoughtful, systematic, or complete, and are often characterized by the first solution identified. In contrast, an individual operating with an avoidant style procrastinates when faced with a problem in the hopes that resolution will be reached without action or by recruiting others to remedy the situation. As expected, positive problem orientation and planful problem-solving style are the dimensions of SPS associated with more efficacious problem-solving endeavors and, by extension, greater reductions in life stress compared to negative problem orientation and avoidant or impulsive-careless problem-solving approaches.

The utility of assessing the integral role of this transdiagnostic coping strategy has been demonstrated across multiple heterogeneous populations struggling with a variety of mental, medical, and comorbid health conditions (Nezu, Nezu, & D’Zurilla, 2013). Indeed, the diathesis-

stress model in which the theory of social problem-solving is grounded provides a compelling framework for explaining the chronicity and severity of both the physical and psychological distress males diagnosed with chronic pelvic pain syndrome unanimously endorse. Furthermore, in the event that social problem-solving is revealed to be a meaningful contributor to the prediction of CP/CPPS symptomatology by the current investigation, social problem-solving ability will not only enhance our understanding of prostatitis syndromes but, more importantly, provide strong theoretical grounds for development of future evidence-based treatment interventions in CP/CPPS.

Diathesis-Stress Model of Problem-Solving. The contemporary diathesis-stress model of problem-solving described by Nezu, Nezu, and D'Zurilla (2013) highlights the reciprocal and cyclic nature of the associations between social problem-solving, daily stress, neurobiological reactions, and health outcomes. We have adapted this model as one possible way in which social problem-solving may impact the physical and psychological adjustment in males diagnosed with CP/CPPS who are under stress (Figure 1, p. 16). Due to the dearth of longitudinal research available identifying precursors to the development of chronic prostatitis, we cannot demonstrate temporal precedence and, by extension, make causal inferences regarding the factors in this theoretical model. Regardless, the cyclic nature of this complex biopsychosocial relationship allows for entrance of the cycle at any step and is therefore flexible to accommodate multiple interpretations of cause and effect in the development, course, and prognosis of CP/CPPS.

Explanation of the Proposed Model. An individual's social problem-solving orientation and style can influence their experience and perception of everyday stressors, such that those equipped with a negative problem orientation and avoidant or impulsive-careless problem-

solving style may be ineffective in managing these daily hassles, which in turn perpetuates the original stress and can create additional difficulties. As a result, the body can be exposed to a chronic state of stress induced by the unresolved problem and ineffective coping strategy, such as pain catastrophizing. Physiological reactivity to the stressor resulting in a dysfunctional HPA axis may be indicated by low baseline concentrations and blunted responses of ACTH, elevated awakening cortisol responses, and inflammatory reactions. These neurobiological reactions are potential mediators of the association between daily stress and health outcomes, a phenomenon referred to as "stress sensitization" (Post, 2007). With time, increasingly less severe stressors acquire the capability to trigger the stress response, which may account for the high levels of perceived stress reported by males with CP/CPPS, particularly in the absence of more numerous stressful experiences. Thus, a pessimistic avoider or quick-fixer may be more likely to develop CP/CPPS or experience greater physical symptomatology (pain, urinary symptoms) and psychological distress (depression, anxiety, reduced quality of life, perceived stress) associated with the diagnosis than an optimistic, planful problem-solver. Poor health outcomes are likely to elevate the experience and perception of daily life stress in males coping with CP/CPPS, as suggested by the "stress generation" hypothesis, with this relationship also mediated by the patient's social problem-solving profile (Hammen, 1991). Repetition of this cycle can help account for the severity and chronicity of this prostatitis syndrome. Conversely, the model can be entered at the health "outcomes" stage to satisfy the equally plausible theory that having a CP/CPPS diagnosis in and of itself initiates this cascade of psychoemotional events.

Investigating the posited role of social problem-solving in CP/CPPS may provide a rationale for the development of interventions designed to improve problem-solving orientation and style, such as Problem-Solving Therapy (PST). In other chronic health populations, PST has been shown to be an effective psychosocial approach that results in significant reductions in the

deleterious mental and motivational effects of stress (Nezu, Nezu, & D'Zurilla, 2013). However, it is important to note that altering ineffective methods for conceptualizing and responding to problems in living addresses only a fraction of the barriers that impede effective problem-solving. Indeed, as Nezu, Nezu, and D'Zurilla (2013) contend, issues of subjective brain overload, emotion dysregulation, biased negative cognitions, and low motivation or hopelessness must also be targeted to allow for significant enhancements in psychological and physiological adjustment.

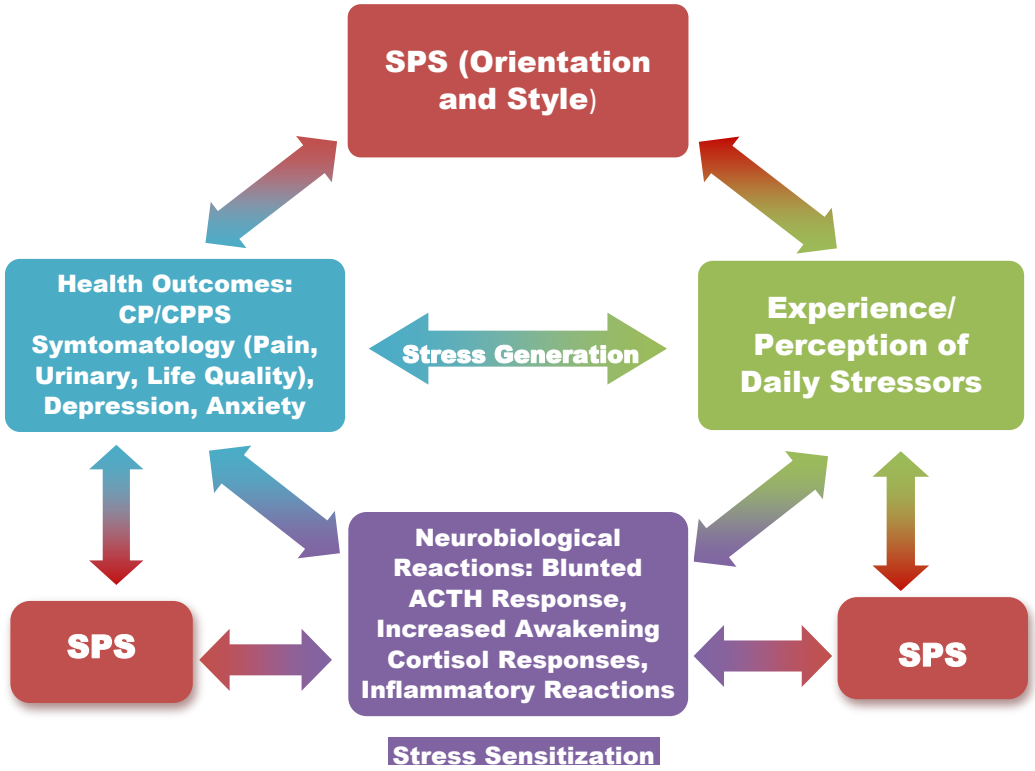

Figure 1: *Adapted Diathesis-Stress Model of Problem-Solving for CP/CPPS*

Social Problem-Solving in Chronic Pain. The significance of social problem-solving has been demonstrated in other chronic pain populations, including those coping with headaches, lower back pain, and noncardiac chest pain (Eskin, Akyol, Celik, & Gultekin, 2013; Siemonsma, Stuive, Roorda, Vollebregt, Lankhorst, & Lettinga, 2011; Nezu, Nezu, Jain, Shepanski

Xanthopoulos, Cos, Friedman, & Lee, 2007; Nezu, Nezu, & Jain, 2008). In an observational study comparing social problem-solving, perceived stress, depression, and life satisfaction in Turkish tension and migraine headache patients to healthy controls, Eskin et al. (2013) found evidence for relatively deficient problem-solving in the headache patient cohorts. Significant discrepancies between the tension/migraine patient and control groups were characterized by lower total scores ($M_{\text{Total Tension}}$ = 12.0, SD = 2.6; $M_{\text{Total Migraine}}$ = 12.6, SD = 2.9; $M_{\text{Total Control}}$ = 13.9, SD = 2.2, p = .002) and PPO dimension scores ($M_{\text{PPO Migraine}}$ = 11.8, SD = 4.2; $M_{\text{PPO Tension}}$ = 12.4, SD = 3.8; $M_{\text{PPO Control}}$ = 14.3, SD = 3.0, p = .004), as well as higher NPO dimension scores ($M_{\text{NPO Tension}}$ = 20.6, SD = 8.3; $M_{\text{NPO Migraine}}$ = 19.1, SD = 9.9; $M_{\text{NPO Control}}$ = 13.0, SD = 7.0, $p < .001$) on the unabridged version of the Social Problem Solving Inventory – Revised (SPSI-R) (Eskin et al., 2013). Eskin and colleagues (2013) also discovered elevated levels of perceived stress on the PSS and depressive symptomatology on the Beck Depression Inventory (BDI) in the headache patient samples compared to the healthy cohort, similar to the results obtained in investigations assessing these variables in males with CP/CPPS. However, patients did not differ from controls in number of negative life events experienced or reported life satisfaction (Eskin et al., 2013).

Additionally, Eskin et al. (2013) note that total problem-solving scores and PPO were negatively correlated with perceived stress, depression, and number of negative life events, as well as positively correlated with life satisfaction, while NPO and ICS demonstrated positive associations with perceived stress, depression, and negative life events but negative relationships with life satisfaction. Avoidant problem-solving style behaved comparably to NPO and ICS, however, AS was not significantly associated with negative life events. Interestingly, rational/planful problem-solving style evidenced a significant, inverse relationship with perceived stress only, and was not found to be related to the other adjustment variables measured (Eskin et al, 2013). The inadequacy of problem-solving skills observed by Eskin and

colleagues (2013) in individuals with tension type and migraine headaches suggests that "problem-solving training/therapy may be a suitable psychosocial intervention strategy for patients suffering from primary headache disorders" (p. 342). By extension, if CP/CPPS patient samples yield analogous deficits in social problem-solving, PST may prove efficacious for males suffering with chronic pelvic pain syndrome as well.

Siemonsma et al. (2011) compared the predictive power of three intervention targets in cognitive treatment of illness perceptions (CTIP) on the outcome of change in physical activity in those coping with chronic, non-specific lower back pain: rational/planful problem-solving, discussion skills, and verbal skills. A hierarchical regression analysis was employed to assess if the introduction of subsequent predictors added significantly to the prediction of change in physical activity from baseline to post-treatment, as measured by the Patient-Specific Functioning List (PSFL). Rational/planful problem-solving dimension scores on the long version of the SPSI-R were inversely related to physical activity change (r = -.193, p = .012), with results of the regression analysis indicating that RPS/PPS was the only significant intervention predictor assessed by this investigation, Δr^2 = .039, p = 0.014 (Siemonsma et al., 2011). Indeed, 3.9% of the variability in physical activity change was accounted for by rational/planful problem-solving style, and each one unit increase in rational/planful problem-solving scores on the SPSI-R was associated with a 0.49 unit reduction in PSFL change scores, β = -0.49 (Siemonsma et al., 2011). Siemonsma and colleagues (2011) suggest that chronic lower back pain patients who obtain a score greater than 43 on the rational/planful problem-solving dimension of the SPSI-R: L are most likely to demonstrate clinically significant change in physical activity following CTIP intervention and are therefore appropriate candidates for this form of cognitive therapy. Perhaps targeting the rational/planful problem-solving skills of CP/CPPS patients will also lead to notable improvement in the pain associated with this condition.

Nezu et al. (2007) and Nezu et al. (2008) evaluated social-problem solving in patients experiencing noncardiac chest pain, prior to undergoing stress myocardial perfusion imaging (MPI) testing to assess for the presence of cardiovascular disease. In a case-control study design, Nezu and colleagues (2007) compared individuals determined to have noncardiac chest pain (NCCP cohort) to those who were suffering from chest pain in the context of underlying cardiovascular disease (CVD cohort). A series of MANOVA analyses were employed to determine if significant differences between the gender, age, and ethnically matched NCCP and CVD samples were present on a variety of pain-related and psychological distress factors. Results indicated no distinction between NCCP and CVD groups on self-reported pain intensity and frequency (F (2,103) = 1.01, p = .37), or anger internalization (F = 0.11, p = .74) and discussion of anger (F = 0.11, p = .74) subscales of the Framingham Anger Scales (FAS) (Nezu et al., 2007). However, those with noncardiac chest pain exhibited significantly elevated levels of depressive (F = .44, p = .008) and anxiety (F = 12.92, p = .001) symptomatology on the Hospital Anxiety and Depression Scale (HADS), perceived stress on the PSS (F = 8.12, p = .005), and somatic anger symptoms (F = 5.67, p = .02) and anger externalization (F = 7.17, p = .009) on the FAS when compared to their CVD counterparts.

Nezu and colleagues (2007) utilized a MANCOVA in order to assess if social problem-solving ability, as measured by the abbreviated, 25-item version of the SPSI-R, the SPSI-R: S, differed between NCCP and CVD cohorts controlling for the prominent negative affectivity (depression, anxiety, perceived stress, anger) characteristic of individuals with noncardiac chest pain. Overall, evidence was found for dissimilarities in social problem-solving between the two groups (F (5,96) = 3.96, p = .003), with individual contrasts demonstrating significant differences in PPO (F = 2.89, p = .005), NPO (F = 2.26, p = .03) and rational/planful problem-solving (F = 3.93, p = .001), yet no significant differences on either AS (F = 0.61, p = .54) or ICS (F = 0.74, p = .46)

(Nezu et al., 2007). As expected, individuals with NCCP had higher levels of negative problem orientation as well as deficits in positive problem orientation and rational/planful problem-solving style.

In an effort to address social problem-solving's capacity to predict both pain-related intensity and frequency in the NCCP cohort above and beyond the influence of negative affectivity, a series of hierarchical regression analyses were conducted. The set of regression analyses with pain intensity serving as the dependent variable revealed that the NPO ($\Delta r^2 = .16$, F (1,84) = 19.83, $p < .001$, $b = 0.17$, $SE_b = 0.04$, $\beta = 0.48$, t (84) = 4.45, $p = .001$) and R/PPS ($\Delta r^2 = .08$, F (1,84) = 9.16, $p = .003$, $b = -0.14$, $SE_b = 0.05$, $\beta = -0.32$, t (84) = 3.03, $p = .003$) dimensions of social problem-solving had a significant contribution to the prediction of pain intensity above and beyond that accounted for by negative affectivity covariates (Nezu et al., 2007). On the contrary, PPO, ICS, and AS did not significantly add to the prediction of pain intensity in NCCP when controlling for negative affectivity variables.

When pain frequency was examined as the dependent variable, similar results were obtained for both NPO ($\Delta r^2 = .07$, F (1,84) =7.56, $p = .007$, $b = 0.10$, $SE_b = 0.04$, $\beta = 0.32$, t (84) = 2.75, $p = .007$) and R/PPS ($\Delta r^2 = .08$, F (1,84) =9.07, $p = .003$, $b = -0.12$, $SE_b = 0.04$, $\beta = -0.31$, t (84) = 3.01, $p = .003$), as both components of SPS significantly contributed to variation in pain frequency above and beyond the contribution of negative affectivity covariates (Nezu et al., 2007). However, AS ($\Delta r^2 = .06$, F (1,84) = 6.39, $p = .01$, $b = 0.10$, $SE_b = 0.04$, $\beta = 0.30$, t (84) = 2.51, $p = .01$) also emerged as a significant predictor of pain frequency, controlling for negative affectivity (Nezu et al., 2007). In this set of regression analyses, neither PPO nor ICS significantly predicted NCCP pain frequency.

In contrast to Nezu et al. (2007), Nezu et al. (2008) focused exclusively on patients with NCCP to determine if SPS mediated the relationship between perceived stress and the intensity and frequency of chest pain symptoms. Results indicated that perceived stress, as measured by PSS, was a significant predictor of both pain intensity (b = .059, SE_b = .015, 95% CI: .028 - .089, β = .284, t (164) = 3.79, p < .001) and pain frequency (b = .047, SE_b = .014, 95% CI: .019 - .076, β = .251, t (164) = 3.32, p < .001). Similar to the statistical analyses performed by Nezu et al. (2007), separate sets of mediational analyses were conducted with either pain intensity or pain frequency as the dependent variable. In both models, NPO (Sobel $_{Intensity}$ z = 3.44, p < .001; Sobel $_{Frequency}$ z = 3.28, p < .001) and R/PPS (Sobel $_{Intensity}$ z = 2.96, p < .01; Sobel $_{Frequency}$ z = 2.70, p < .01) were determined to be significant mediators of the perceived stress-pain relationship (Nezu et al., 2008). While AS (Sobel $_{Frequency}$ z = 2.21, p < .05) and ICS (Sobel $_{Frequency}$ z = 2.01, p < .05) were also found to be significant mediators of the association between perceived stress and pain frequency at the .05 α-level, these coping styles failed to meet the α ≤ .01 criteria for statistical significance selected to reduce the familywise error introduced by assessing all five dimensions of SPS for each dependent variable. PPO did not emerge as a statistically significant mediator of the perceived stress-pain relationship, even at the .05 α-level.

In sum, the investigations conducted by Nezu and colleagues (2007; 2008) in individuals coping with NCCP suggest that SPS is an important determining factor of both the frequency and intensity of cardiac pain these patients report, particularly in the realms of greater negative problem orientation and reduced rational/planful problem-solving style. Such outcomes echo the conclusions of Eskin et al. (2013) and Siemonsma et al. (2011), marshalling evidence for the notion that the SPS deficits of chronic pain patients have a prominent impact on psychological and physical adjustment, elements of coping that can be improved with psychosocial interventions, particularly Problem-Solving Therapy.

Problem-Solving Therapy (PST) for Chronic Pain and Illness. Despite evidence that inadequate social problem-solving serves an important function in perpetuating distress in multiple chronic pain conditions, very few PST outcome studies have been implemented in such patient populations. Van den Hout, Vlaeyen, Heuts, Zijlema, & Wijen (2003) and Smeets, Vlaeyen, Kester, & Knottnerus (2006) assessed PST as an adjunct to graded activity (GA) in patients coping with nonspecific chronic low back pain using a randomized controlled trial design. Graded activity is an operant behavioral treatment that utilizes positive reinforcement to encourage gradual increases in activity levels. Van den Hout et al. (2003) compared employees randomly assigned to receive one of two combination interventions, GA plus PST (GAPS group) or GA plus group education (GAGE group), on days of sick leave and work status. Compared to employees in the GAGE group, a higher percentage of those who received the GAPS intervention achieved 100% return-to-work status at twelve month follow-up (85.4% vs. 62.9%) (Van den Hout et al., 2003). Additionally, 23% of employees in the GAGE condition in contrast to only 10% in the GAPS condition were receiving disability compensation one year after intervention (Van den Hout et al., 2003). However, the differences observed in regards to work status were not statistically significant. Individuals in the GAPS group also reported significantly fewer days of sick leave at twelve month follow-up compared to members of the GAGE group (adjusted r^2 = 0.077, $\beta = 0.284$, $p < .05$) (Van den Hout et al., 2003). Van den Hout and colleagues (2003) concluded that the addition of PST to GA therapy was effective in reducing sick leave and improving work retention of employees coping with chronic lower back pain, suggesting that social problem-solving skills training can serve as a valuable target of treatment intervention in chronic pain patients.

Smeets et al. (2006) assessed the relationship between three active treatment interventions and a waiting list control (WL condition), including active physical treatment (APT

condition), an aggregate cognitive-behavioral treatment of GA and PST (CBT condition), and a combination treatment of both APT and CBT (CT condition). Though this investigation focused primarily on pain catastrophizing as measured by the Pain Cognition List (PCL), changes in disability (Roland Disability Questionnaire: RDQ), patient-specific complaints, current pain levels, and depressive symptomatology (Beck Depression Inventory: BDI) were also assessed. At post-treatment assessment conducted immediately after ten weeks of intervention, significant and comparable reductions in pain catastrophizing, disability, patient-specific complaints, and current pain were detected across all three conditions (APT, CBT, CT) compared to control (WL). However, APT was the only intervention successful in also decreasing reported symptoms of depression. Smeets and colleagues (2006) found evidence for pain catastrophizing as a significant mediator of the relationship between intervention and disability, patient-specific complaints, and current pain in regards to APT, CBT, and CT. Additionally, pain catastrophizing was found to mediate the APT-depression association. Like Van den Hout et al. (2003), Smeets et al. (2006) demonstrate that PST can serve to alleviate physical symptoms in individuals with chronic low back pain and posit that declines in pain catastrophizing may serve as a mechanism of change for the interventions examined.

Regardless of the fact that PST has only been applied sparingly to chronic pain populations, the efficacy of this psychotherapeutic intervention has been well established in other domains of chronic illness. Most notably, however, Problem-Solving Therapy is well equipped to handle the complexity of comorbid psychological disorders in medical patient populations and has been successfully applied to primary care, cancer, diabetes, and cardiovascular disease patients who are also suffering from depression and/or anxiety (Nezu, Nezu, & D'Zurilla, 2013). Indeed, males diagnosed with CP/CPPS comprise a patient population rife with depression, anxiety, stress, pain catastrophizing, and a depleted quality of life,

biopsychosocial correlates which strongly suggest social problem-solving may provide an important missing piece in the development of psychotherapeutic interventions for chronic prostatitis.

Psychotherapeutic Interventions for Chronic Prostatitis. Miller et al. (1988) was among the first to implement a stress management intervention in men coping with chronic pelvic and genital pain. Miller's stress management "therapy" consisted of dissemination of educational materials detailing the healthy prostatic stress response as well as a plan for stress reduction. Patients were not provided with any additional medical treatment, such as prostatic massage or pharmacotherapy, and were asked to return for in-person follow-up or complete a questionnaire via postal mail to assess for any changes in symptoms. Of the 134 males successfully reached for follow-up at any time point, 86% (*n* = 110) reported that their prostatitis symptoms were "better", "much better", or "cured". Additionally, 86.57% of the 58 patients tracked for over a year endorsed one of these three positive responses. Miller et al. (1988) interprets these findings as support for the potential long-term efficacy of stress management programs in alleviating pain in CP/CPPS patients, and argues that such psychosocial interventions promise more success than the common biomedical treatment options for this diagnosis. Indeed, Miller (1988) asserts,

> It is my contention that stress management will provide the greatest single benefit to the man suffering from the symptoms of chronic prostatitis, etc. Also, failure to manage stress successfully is a major reason why some men continue to be plagued by chronicity of symptoms. (p. 509)

It is remarkable that the pivotal role of stress in the exacerbation of chronic prostatitis syndromes was recognized and embraced so enthusiastically by Miller in 1988, yet serious

efforts to develop psychotherapeutic interventions for CP/CPPS did not begin until almost two decades later. Nickel, Mullins, and Tripp (2008) were pioneers in outlining the first evidence-based, cognitive behavioral therapy (CBT) program designed exclusively for the treatment of the physical and psychological distress characteristic of this patient population. Nickel and colleagues (2008) constructed a weekly, one-hour eight session program designed to be delivered by a urology nurse or similar healthcare provider. Primary goals of this cognitive-behavioral treatment entail fostering hope in the notion that CP/CPPS symptoms can become manageable, encouraging self-efficacy and wellness-focused coping strategies, reducing automatic negative thinking, and anticipating barriers that may be encountered during symptom self-management efforts. Patients are encouraged to log everyday problems encountered, their associated automatic thoughts and emotions in relation to these problems, and their actual reactions to the situation using a "Reaction Record". Negative automatic thoughts such as pain catastrophizing and maladaptive reactions like illness-focused coping are then challenged and revised. This treatment also incorporates assertiveness training and listening skills in an effort to help bolster social support systems (Nickel et al., 2008).

Though the CBT intervention designed by Nickel and colleagues (2008) has not yet been evaluated in a large scale, randomized controlled trial (RCT), Tripp, Nickel, & Katz (2011) conducted a feasibility trial of the proposed program using a small sample of men diagnosed with CP/CPPS (n = 11). Favorable results regarding the efficacy of this psychosocial therapy were obtained despite sample size, particularly in the physical health outcomes assessed. Notably, Tripp et al. (2011) reported a statistically and clinically significant reduction in overall CP/CPPS symptomatology, as measured by NIH-CPSI total scores, of 7.25 points (p = .007). Further analysis revealed that both the Pain (p = .015) and Quality of Life Impact (p = 0.013) subscales of the NIH-CPSI evidenced significant decreases from baseline to post-treatment, though there was

no significant change in Urinary dimension scores (p = .087) (Tripp et al., 2001). In regards to psychosocial risk factors, pain on the Short-Form McGill Pain Questionnaire (F (1,10) = 4.875, p = .049), disability on the Pain Disability Index (F (1,10) = 7.702, p = .020), and pain catastrophizing on the PCS (F (1,10) = 12.896, p = .005) had significantly declined upon program completion (Tripp et al., 2011). However, patients did not endorse any changes in depressive symptomatology (F (1,10) = .776, p = .399) or social support (F (1,10) = .438, p = .532) (Tripp et al., 2011). Unfortunately, Tripp and colleagues (2011) found no significant correlations between change in the three significant psychosocial risk factors that emerged and change in NIH-CPSI total or subscale scores, likely a result of this pilot study's low power. Regardless, preliminary results presented by Tripp et al. (2011) concerning the implementation of a theoretically grounded, cognitive-behavioral course of treatment for CP/CPPS patients show promise for future, similar psychosocial interventions.

Potential Impact of Problem-Solving Correlates in the Development of Effective Interventions for Chronic Prostatitis. It is important to consider both areas of overlap as well as the unique features regarding the treatment goals and psychotherapeutic components of Nickel et al.'s (2008) program and Problem Solving Therapy (PST). Though PST falls under the category of psychotherapeutic interventions known as Cognitive Behavioral Therapy or CBT, PST is unique in its multifaceted approach to helping a patient achieve his or her treatment goals by addressing several important clinical targets that can serve as obstacles to effective problem-solving under stress. These treatment targets, as outlined by Nezu et al. (2013), include brain overload when under stress, emotional dysregulation, negative thoughts (for example, catastrophic thinking), low motivation/hopelessness, and finally a lack of planful problem solving skills.

Despite its name, PST does not focus exclusively on cultivation of effective problem-solving skills. In fact, planful problem-solving skills comprise only one of the four major toolkits that lay the foundation for PST. The CBT intervention for chronic prostatitis, as it is described by Nickel et al. (2008), appears to focus almost exclusively on changing patterns of negative thinking/ feelings of hopelessness, which are also targeted in PST. Additionally, this CBT intervention was reported to target identification of current problems in one's life and provide guidance in changing patterns of behavior associated with these difficulties. As such, these two therapeutic components represent areas of overlap between the CBT intervention designed by Nickel and colleagues (2008) and PST. However, PST is unique as an intervention due to its expanded therapeutic focus, which includes techniques aimed at reducing the reactive experience of being overwhelmed when under stress as well as specific tools for improving emotional regulation. The affective toolkits of PST have become an important element of the intervention and are consistent with the latest research regarding the neuroscience of emotion and non-conscious emotional processing (Nezu, Nezu & D'Zurilla, 2013; LeDoux, 1996). The fact that PST not only shares some similarities with Nickel et al.'s (2008) CBT self-management program, but also incorporates additional, potentially impactful targets of intervention such as emotional reactivity and autonomic arousal, suggests that a closer examination of social problem-solving ability and CP/CPPS symptoms is warranted.

Consequently, the current investigation sought to formally assess the associations between the construct of social problem-solving and symptoms in males suffering from CP/CPPS. In an effort to address this relationship in a more comprehensive context, both levels of perceived stress and the actual experience of daily hassles were considered. The present study sought to demonstrate that social problem-solving plays a significant role in predicting symptoms of CP/CPPS when perceived stress and daily life stress are accounted for, as well as

explore the proposed nature of this role as a moderator of the stress-symptom relationship. Examination of two concepts of stress simultaneously for any distinct relationships with social problem-solving and CP/CPPS symptomatology comprised a secondary goal of this investigation. We anticipate that this investigation will lay the foundation for the future application of PST in the chronic prostatitis patient population.

Study Hypotheses

Hypothesis 1: Correlational Analyses. The first set of hypotheses focused on simple Pearson product-moment correlational analyses in an effort to demonstrate significant associations between social problem-solving, CP/CPPS symptomatology, and measures of both daily stressful experiences and perceived stress.

The present study hypothesized that total social problem-solving on the SPSI-R: S would be significantly correlated with total CP/CPPS symptomatology on the NIH-CPSI, total daily stress on the Survey of Recent Life Experiences (SRLE), and perceived stress on the PSS. Specifically, effective dimensions of social problem-solving including PPO and PPS were posited to display negative associations with CP/CPSS symptoms (pain, urinary symptoms, quality of life impact), daily stress, and perceived stress. Conversely, ineffective social problem-solving characterized by NPO, ICS, and AS were postulated to demonstrate positive correlations with CP/CPPS symptoms (pain, urinary symptoms, quality of life impact), daily stress, and perceived stress.

Hypothesis 2: Hierarchical Multiple Regression Analyses. A set of hierarchical multiple regression analyses was employed to evaluate if social problem-solving predicted CP/CPPS symptomatology above and beyond both daily life stress and perceived stress, controlling for any significant demographic covariates that emerged during correlational analyses conducted to test the first hypothesis. It should be noted that the sample size was not sufficiently large as

determined by an a priori power analysis (required *N* = 92) at the time of this report to achieve adequate power. Figure 2 displays the proposed hierarchical regression equations in detail.

It was posited that total social problem-solving would significantly predict CP/CPPS symptomatology (pain, urinary symptoms, quality of life impact) above and beyond the variance already accounted for by total daily life stress, while controlling for relevant demographic covariates of the sample. Specifically, ineffective dimensions of social problem-solving, including NPO, ICS, and AS, were hypothesized to predict poorer physical adjustment in the context of daily hassles, controlling for demographics. Conversely, efficacious elements of social problem-solving, namely PPO and PPS, were hypothesized to predict superior physical adjustment in the context of daily hassles, controlling for demographics. The same hierarchical regression hypotheses were tested using perceived stress in place of daily life stress to explore any differential results in social problem-solving's predictive ability of CP/CPPS symptomatology based on the use of each distinct, stress-related construct.

NIH-CPSI = Block 1 [*Demographic Covariates*] + Block 2 [*SRLE*] + Block 3 [*SPSI-R: S: NPO, PPO, PPS, ICS, AS*]

NIH-CPSI = Block 1 [*Demographic Covariates*] + Block 2 [*PSS*] + Block 3 [*SPSI-R: S: NPO, PPO, PPS, ICS, AS*]

Figure 2: *Hypothesis 2 Hierarchical Regression Analyses Equations*

Hypothesis 3: Moderation Analyses. Finally, hierarchical regression moderation analyses were conducted to determine if social problem-solving significantly moderated the daily stress – CP/CPPS symptoms and/or perceived stress – CP/CPPS symptoms relationship. Analyses of simple slopes were to be utilized to examine the details of any significant

moderation effects observed. Similarly, the sample size was not sufficiently large (*N* = 92) to be adequately powered for these analyses at the present time.

Social problem-solving was theorized to be a significant moderator of the relationship between daily life stress and CP/CPPS symptoms (pain, urinary symptoms, quality of life impact). Conversely, social problem-solving was also predicted to be a significant moderator of relationship between perceived stress and CP/CPPS symptoms (pain, urinary symptoms, quality of life impact). Figure 3 displays the proposed hierarchical regression equations for the moderation analyses.

NIH-CPSI = Block 1 [*Demographic Covariates*] + Block 2 [*SRLE*]
+ Block 3 [*SPSI-R: S: NPO, PPO, PPS, ICS, AS*]
+ Block 4 [*SPSI-R: S* X *SRLE*]

NIH-CPSI = Block 1 [*Demographic Covariates*] + Block 2 [*PSS*]
+ Block 3 [*SPSI-R: S: NPO, PPO, PPS, ICS, AS*]
+ Block 4 [*SPSI-R: S* X *PSS*]

Figure 3: *Hypothesis 3 Moderation Analyses Equations*

CHAPTER 2: METHODS

Participants

30 participants were recruited from two sites, Central Maryland Urology Associates, P.A. located in Columbia, Maryland and The Center for Pelvic Medicine at Bryn Mawr Urology, LLC located in Bryn Mawr, Pennsylvania, beginning in the summer of 2014. Male patients eighteen years of age or older were invited to participate in this investigation if they had a diagnosis of nonbacterial Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS), as indicated by Category IIIA (inflammatory) or Category IIIB (non-inflammatory) of the current National Institutes of Health (NIH) classification system for prostatitis syndromes (Krieger, Nyberg, & Nickel, 1999). Diagnoses were confirmed by a board certified urologist or certified registered nurse practitioner serving as expert collaborators on this investigation. As such, participants were required to provide permission to the research team to verbally access medical information pertinent to the CP/CPPS diagnosis and related medical conditions in order to be considered eligible. In addition, participants must have had the ability to read and understand English on at least a sixth grade level.

Patients were considered ineligible in the event that they endorsed any of the fourteen exclusionary criteria outlined by the National Institutes of Diabetes and Digestive and Kidney Diseases (NIDDK) for a bacterial CP/CPPS research. Exclusions related to current comorbid medical conditions included a) cancer of the genitourinary tract b) active urinary stone disease c) herpes of the genitourinary system d) peri-rectal inflammatory disorders e) inflammatory bowel disease f) urethral stricture of 12 French or smaller and/or g) neurological disease or disorder affecting the bladder. Within the past three months, patients must not have had a) bacteriuria b) antibiotic therapy c) gonorrhea, chlamydia, mycoplasma, or trichomonas infection

of the urinary tract d) clinical epididymitis, and/or e) prostate surgery (not including cystoscopy). Additionally, individuals with a history of a) pelvic radiation or systemic chemotherapy and/or b) intravesical chemotherapy were unable to participate in this investigation.

Measures

Demographics. Basic demographic information was collected from participants, including age, race, ethnicity, years of education, employment status, annual income, marital status, relationship duration, and number of children. Participants were asked to provide health-related information, such as history or current use of nicotine or alcohol, additional medical diagnoses, and history or current use of psychotherapy or psychotropic medications. Participants also reported the date they first received a diagnosis of Chronic Prostatitis/Chronic Pelvic Pain Syndrome, as well the duration of the symptoms they had experienced pertaining to this diagnosis. In addition, interest in and preference for format of potential stress management programs was queried.

Social Problem-Solving (SPSI-R: S). Social problem-solving, the affective, cognitive, and behavioral process of identifying or producing adaptive methods for solving real-world problems, was measured with the 25-item short version of the Social Problem-Solving Inventory Revised (SPSI-R: S) (D'Zurilla, Nezu, & Maydeu-Olivares, 2002). The SPSI-R: S captures two broad dimensions of social problem-solving, including problem orientation and problem-solving style, through five distinct subscales: positive problem orientation, negative problem orientation, planful problem-solving style, impulsivity/carelessness style, and avoidance style. Each item is rated on a 5-point Likert scale from 0 (*not at all true of me*) to 4 (*extremely true of me*), with higher scores indicative of stronger endorsement of the associated problem-solving dimension. The SPSI-R: S has demonstrated good to excellent internal reliability across all five dimensions

(Cronbach's α = 0.79 – 0.95) and high test-retest reliability (*r* = 0.93, 0.89) (D'Zurilla, Nezu, & Maydeu-Olivares, 2002).

SPSI-R: S: Positive Problem Orientation. Positive problem orientation is conceptualized as an adaptive set of optimistic yet realistic beliefs about the problem-solving process and one's ability to solve problems successfully. Moreover, persons with a positive problem orientation view negative emotions as manageable and useful to the problem-solving process. Such individuals are characterized by a strong sense of self-efficacy and tend to view the problems they encounter in everyday living as solvable challenges requiring time, effort, and commitment (D'Zurillia, Nezu, & Maydeu-Olivares, 2004). Those possessing a positive problem orientation would endorse items on the SPSI-R: S such as "When I have a problem, I try to see it as a challenge, or opportunity to benefit in some positive way from having the problem".

SPSI-R: S: Negative Problem Orientation. Conversely, negative problem orientation is a dysfunctional schema of pessimistic beliefs about problem-solving and one's ability to problem solve. A negative problem orientation is characterized by negative emotional reactivity and poor emotional regulation when reacting to a problematic situation. Those possessing a negative problem orientation have low self-efficacy and generally view problems as threats that frequently elicit frustration and emotional distress (D'Zurillia, Nezu, & Maydeu-Olivares, 2004). Negative problem orientation is captured by items like "I feel threatened and afraid when I have an important problem to solve".

SPSI-R: S: Planful Problem-Solving Style. Planful problem-solving style, like positive problem orientation, is another component of constructive problem-solving. Planful problem-solvers methodically employ four key skills: problem definition/formulation, generation of alternative solutions, decision making, and solution implementation/verification (D'Zurillia,

Nezu, & Maydeu-Olivares, 2004). Individuals with a planful problem-solving style would agree with the SPSI-R: S statement “When I have a decision to make, I try to predict the positive and negative consequences of each option”.

SPSI-R: S: Impulsivity/Carelessness Style. The impulsivity/carelessness style refers to the hurried, haphazard application of the four problem-solving skills utilized by the rational problem-solver. Individuals with an impulsivity/carelessness style of problem-solving often consider only a small subset of alternatives and rely on instinct rather than calculated analysis in choosing a solution (D’Zurillia, Nezu, & Maydeu-Olivares, 2004). For example, a representative impulsivity/carelessness style item of the SPSI-R: S is “When I am trying to solve a problem, I go with the first good idea that comes to mind”.

SPSI-R: S: Avoidance Style. Similar to the impulsivity/carelessness style, avoidance style is also a maladaptive approach to problem-solving. Avoidant problem-solvers tend to procrastinate, waiting for problems to either solve themselves or be solved by others (D’Zurillia, Nezu, & Maydeu-Olivares, 2004). There is also a tendency to avoid the negative emotions that are involved in confronting problems. Those with avoidance style would endorse SPSI-R: S items such as “I wait to see if a problem will resolve itself first, before trying to solve it myself”.

Current CP/CPPS Symptomatology (NIH-CPSI). Symptomatology characteristic of CP/CPPS and experienced over the past week was assessed with the National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI) (Litwan, McNaughton-Collins, Fowler, Nickel, Calhoun, Pontari, Alexander, Farrar, & O’Leary, 1999). The NIH-CPSI is a 13-item questionnaire composed of three subscales: Pain (8 items), Urinary Symptoms (2 items), and Quality of Life Impact (3 items). The NIH-CPSI can be scored both as a total, with overall scores ranging from 0 to 43, and separately by dimension.

***NIH-CPSI: Pain*.** Possible scores on the Pain subscale of the NIH-CPSI range from 0 to 21, with higher scores suggestive of more pain and discomfort. Response format varies by item, and are rated as yes/no, on a 6-point Likert scale ranging from 0 (*never*) to 5 (*always*), or on a 11-point Likert scale ranging from 0 (*no pain*) to 10 (*pain as bad as you can imagine*). Items representative of the Pain dimension include "Which number best describes your average pain or discomfort on the days that you had it, over the last week?" and "In the past week, have you experienced pain or discomfort during or after sexual climax (ejaculation)?".

NIH-CPSI: Urinary Symptoms. NIH-CPSI Urinary Symptoms dimension scores can range from 0 to 10, with responses recorded on a 6-point Likert scale from 0 (*not at all*) to 5 (*almost always*). As such, higher scores on this subscale indicate greater frequency of urinary/voiding symptoms. Items include "How often have you had to urinate again less than two hours after you finished urinating, over the last week?" and "How often have you had the sensation of not emptying your bladder completely after you finished urinating, over the last week?".

NIH-CPSI: Quality of Life Impact. The Quality of Life Impact subscale of the NIH-CPSI can have scores ranging from 0 to 12, where higher scores are indicative of poorer quality of life. Similar to the Pain dimension, response format of items comprising the Quality of Life Impact dimension vary by item and are either rated on a 4-point Likert scale from 0 (*none*) to 3 (*a lot*) or a 7-point Likert scale from 0 (*delighted*) to 6 (*terrible*). Sample items include "How much have your symptoms kept you from doing the kinds of things you usually do, over the last week?" and "If you were to spend the rest of your life with your symptoms just the way they have been during the last week, how would you feel about that?".

Daily Stress (SRLE). In order to assess the experience of a variety of minor, daily hassles or stressors, Kohn and Macdonald's (1992) Survey of Recent Life Experiences (SRLE) was

employed. The SRLE queries respondents about the degree to which 51 common hassles were a part of their life over the past month using a 4-point Likert scale, where 1 corresponds to *not at all* (part of my life) and 4 corresponds to *very much* (part of my life). As such, total scores on the SRLE can range from 51, which suggests that no hassles were experienced, to 204 indicating all hassles were experienced and with high severity. Comprised of six factors, the SRLE taps several dimensions of daily stress including social and cultural difficulties, work, time pressure, finances, social acceptability, and social victimization. Sample stressors surveyed by this scale are "conflict with family member(s)", "dissatisfaction with work", "too many things to do at once", "financial burdens", "dissatisfaction with your physical fitness" and "being taken for granted". The SRLE is characterized by excellent internal reliability (Cronbach's $\alpha = .91 – .92$) and moderate convergent validity with Cohen et al.'s (1983) Perceived Stress Scale (PSS) ($r = .57 – .60$, $p < .01$), as demonstrated in both an item-selection and cross-replication adult, community subsample (Kohn & Macdonald, 1992; Cohen, Kamarack, & Mermelstein, 1983).

Kohn and Macdonald (1991) present the SRLE as a "decontaminated" measure of daily hassles, highlighting the issue that popular scales used to measure this construct, such as Kanner et al.'s (1981) Hassles Scale, confound the *experience* of such stressors with their physical and psychological *consequences* (Kanner, Coyne, Schaefer, & Lazarus, 1981). Indeed, the need for a hassles scale that seeks to separate theoretical cause from effect by increasing sensitivity to temporal precedence is particularly salient in medical patient populations. Therefore, the SRLE is well-suited for use in a sample of males diagnosed with CP/CPPS, a chronic pain condition in which stress and physical symptomatology are likely profoundly intertwined.

Perceived Stress (PSS). In an effort to explore any significant differences between the experience of daily stressors and the perception of stress in males with chronic prostatitis, the

Perceived Stress Scale (PSS) by Cohen, Kamarck, and Mermelstein (1983) was administered in conjunction with the SRLE. Comprised of 14 items rated on a 5-point Likert scale from 0 (*never*) to 4 (*very often*), the PSS is designed to capture the degree to which individuals subjectively evaluate their lives over the past month as stressful (i.e. overwhelming, unpredictable, and/or uncontrollable). Total scores on the PSS are calculated by reverse scoring the seven positively worded items and combining these scores with those obtained on the remaining seven items. As such, the possible range of scores on this scale is 0 (no stress perceived) to 56 (stress perceived very often). Select items on the Cohen et al. (1983) PSS include "In the last month, how often have you felt nervous and 'stressed'?", "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?", and "In the last month, how often have you been able to control irritations in your life?". The PSS has demonstrated good internal consistency (Cronbach's α = .84 - .86) and variable but adequate test-retest reliability (r = .55 - .85) (Cohen et al., 1983).

Procedure

Potentially eligible patients were identified by the team of urologists and clinicians practicing at Central Maryland Urology Associates and The Center for Pelvic Medicine. Eligibility for study participation was verified by board certified urologist Frank M. Nezu, M.D. or certified registered nurse practitioner Jennifer Fariello, MSN, RNC, CRNP, as outlined by an eligibility attestation letter endorsed by both Dr. Nezu and Ms. Fariello. Advertisements including flyers approved by Drexel University's Institutional Review Board (IRB) were posted in the exam rooms and waiting areas to facilitate physician and patient self-referrals. Dr. Nezu and Ms. Fariello were responsible for maintaining lists of patients recommended by the teams who agreed to be contacted for participation in the study. In accordance with HIPAA, initial contact with

participants in regards to study participation was made by the referring physician in person or via telephone using a script devised by the researchers. Participants were scheduled to meet with a member of the investigative team in order to complete the informed consent process and study measures in-person at CMUA or The Center for Pelvic Medicine. Timeslots were successive and staggered, such that each participant was consented privately by the research coordinator to ensure confidentiality and to allow individuals to ask any questions that arose during the informed consent process in a secure setting.

Those who expressed an inability to meet with the research team onsite during the designated days and times were given the option to complete the questionnaire electronically or by pre-paid postal mail. Individuals who choose to participate by completing the surveys remotely were mailed a consent form so that the informed consent process could be conducted by the research coordinator via telephone. Participants were instructed to return the signed consent form via pre-paid postal mail prior to completing the questionnaire. Participants were compensated for their time and effort in the form of a $5.00 Starbucks© gift card. This investigation was approved by Drexel University's IRB prior to the start of any research-related activities.

Ethical Considerations. Maintaining confidentiality is an important consideration in any investigation, particularly when data collected involves sensitive information pertaining to participant health. As such, all data was de-identified by assigning a unique numeric code to each respondent, allowing confidential information to be maintained separately from data files in distinct, locked filed cabinets located in secure lab offices on Drexel University's campus. Additionally, only select members of the research team, namely the principal investigator, co-principal investigator, and research coordinator, maintained access to the files containing

confidential information. Only recruitment site staff members had initial contact with potential participants unless a patient provided explicit permission to be contacted directly by a member of the investigative team, in accordance with HIPAA.

All research assistants underwent thorough training required to handle data and other sensitive participant information with extreme care. Where patient safety is concerned, all research personnel were instructed by a board certified licensed clinical psychologist in the proper protocol for suicide risk assessment in the event that any participant disclosed suicidal ideation. It is important to note that some individuals may experience mild psychological distress in responding to a battery of measures related to their health and stress. Though the likelihood of such distress occurring was low, it was emphasized that respondents may choose to terminate their participation at any time without consequence or impact on the medical care they received.

CHAPTER 3: RESULTS

Data Analytic Approach

Preliminary statistical analyses included basic descriptive statistics, correlations, and factorial ANOVA to assess the relationships between continuous and categorical demographics and CP/CPPS symptoms in order to determine the presence of any significant covariates to be controlled for in subsequent analyses. Bivariate Pearson-product moment correlations were used to examine the relationships between all variables of interest (Hypothesis 1). Hierarchical multiple regression was employed in order to test more sophisticated hypotheses (Hypotheses 2 and 3), that is, to determine social problem-solving's ability to predict CP/CPPS symptomatology over and above both the experience of daily life stress and perceived stress, as well as assess for any significant moderating effects that social problem-solving demonstrated in the relationships between stress and physical adjustment. Due to the small sample size available at the time of this report, all correlational and regression analyses included only total scale scores of the major variables of interest. Subscales scores are not discussed in detail beyond descriptive and correlational analyses, however, a complete correlation matrix including dimensional scores is included for reference in Table 4 (p. 60). Results displayed in the expanded matrix should be interpreted with caution.

Descriptive Analyses

Table 1 displays the demographic characteristics of the study sample (*N* = 30: 29 CMUA patients, 1 Bryn Mawr Urology patient). The majority of participants were middle aged (*M* = 47.9 years, *SD* = 15.2), non-Hispanic Caucasian men who were working full-time, married or living with a partner, and had children. Overall, the sample was highly educated and affluent with most participants possessing a graduate degree and reported annual income greater than

$100,000. On average, participants had been experiencing symptoms of CP/CPPS (pain, urinary symptoms, and/or sexual dysfunction) for approximately 9.5 years (*M* = 114.4 months, *SD* = 150.0) at the time of the study, with symptom duration ranging from 4 months to 43.7 years. 80% of the sample (*n* = 24) had been experiencing persistent pain in the pelvic region for at least the past three months prior to participation.

Table 2 contains the means and standard deviations of the primary variables of interest, including total social problem-solving, experience of daily stress, perceived stress, and CP/CPPS symptomatology.

Report of current CP/CPPS symptomatology in the sample, as measured by total score on the NIH-CPSI, was comparable to but somewhat lower than other samples of men diagnosed with chronic pelvic pain described in the literature (*M* = 18.20, *SD* = 7.62) (Anderson et al., 2008; 2009; Ahn et al. 2012). Participants reported an average NIH-CPSI pain subscale score of 8.83 (*SD* = 4.11, *Range* = 0 – 17), a mean urinary symptom dimension score of 3.67 (*SD* = 2.54; *Range* = 0 – 9), and an average quality of life impact subscale score of 5.70 (*SD* = 2.96; *Range* = 1 – 11).

Men in this sample endorsed higher levels of perceived stress on the PSS compared to those reported in other CP/CPPS patient samples (*M* = 29.73, *SD* = 4.24) (Anderson et al., 2008; 2009; Aubin et al., 2008), but somewhat lower levels of perceived stress than chronic migraine and tension headache pain samples (M_{Migraine} = 42.4, *SD* = 8.5; M_{Tension} = 45.8, *SD* = 8.2) (Eskin et al., 2013). However, it is important to note that the PSS means reported by Eskin and colleagues (2013) were particularly elevated and may not constitute an appropriate comparison group. Consistent with previous findings, perceived stress in the current sample was also greater than the normative mean derived from both a male college student sample (M_{Student} = 22.38, 21.73,

SD = 6.79, 8.42) and male community sample ($M_{Community}$ = 24.0, *SD* = 7.80) (Cohen, Kamarck, & Memelstein, 1983).

Where the experience of daily stress is concerned (total SRLE), participants in this investigation had an average level of daily stressful experiences comparable to that found in a non-clinical psychiatric sample (*M* = 84.29, *SD* = 19.57; $M_{Non\text{-}Clinical}$ = 88.13, *SD* = 20.21) (Goldstone, Farhall, & Ong, 2011). The sample was characterized by a mean SRLE time pressure subscale score of 18.15 (*SD* = 6.71, *Range* = 9 – 30), a work dimension score of 12.27 (*SD* = 4.84, *Range* = 7 – 26), a social acceptability subscale score of 9.07 (*SD* = 2.74, *Range* = 6 – 18), a social victimization dimension score of 6.33 (*SD* = 1.88, *Range* = 4 – 11), a finances subscale score of 8.53 (*SD* = 3.10, *Range* = 6 – 17), and a social cultural difficulties dimension score of 15.07 (*SD* = 2.95, *Range* = 11 – 22). Consequently, the main sources of daily stress for men in the present study were related to dissatisfaction with work and feeling that there was not enough time available to satisfy multiple responsibilities.

On average, positive problem orientation ($M_{PPO\ Sum}$ = 12.57, *SD* = 3.37, *Range* = 4 – 20) was more prominent in the sample than negative problem orientation ($M_{NPO\ Sum}$ = 6.33, *SD* = 4.26, *Range* = 0 – 18). Men in the sample also evidenced relatively higher levels of planful problem-solving style scores ($M_{PPS\ Sum}$ = 12.73, *SD* = 3.31, *Range* = 7 – 18) compared to avoidant ($M_{AS\ Sum}$ = 6.50, *SD* = 4.42, *Range* = 1 – 17) and impulsive/careless problem-solving style scores overall ($M_{ICS\ Sum}$ = 4.23, *SD* = 3.18, *Range* = 0 – 10). All SPSI-R: S subscale scores were comparable to those obtained from a normative sample of middle-aged adults ($M_{MA\ PPO}$ = 13.53, *SD* = 3.85; $M_{MA\ NPO}$ = 5.15, *SD* = 3.85; $M_{MA\ PPS}$ = 12.11, *SD* = 3.59; $M_{MA\ AS}$ = 4.38, *SD* = 3.70; $M_{MA\ ICS}$ = 4.80, *SD* = 4.31) (D'Zurilla, Nezu, & Maydeu-Olivares, 2002).

Table 3 displays the interests and preferences for potential stress management-based programs designed for men coping with CP/CPPS. 46.3% of the sample was somewhat (*n* = 10) or very interested (*n* = 4) in participating in such a program, with the majority (43.3%, *n* = 13) indicating a preference that sessions be conducted in person and one-on-one. Participants were most interested in learning how to relax their bodies (70%, *n* = 21), think healthier (53.3%, *n* = 16), and cope with and manage negative emotions (50%, *n* = 15). Salient barriers that would reportedly prohibit program participation included time commitment (50%, *n* = 15), and the feeling that one already managed stress effectively (30%, *n* = 9).

Correlational Analyses

Table 2 contains the Pearson product-moment correlations of the major study variables and their respective significance levels. As hypothesized, overall social problem-solving ability (total SPSI: R – S) was significantly negatively associated with CP/CPPS symptomatology (total NIH-CPSI) (r (30) = -.45, p = .012, r^2 = .20) and daily stressful experiences (total SRLE) (r (30) = -.41, p = .025, r^2 = .17). Contrary to our predictions, total social problem-solving was not significantly correlated with perceived stress (total PSS), though the nonsignificant relationship was in the expected direction (r (30) = -.24, p = .212, r^2 = .06). Additionally, both total daily stressful experiences and perceived stress evidenced significant, positive relationships with one another (r (30) = .65, p < .001, r^2 = .42) and CP/CPPS symptomatology as expected, r (30) = .52, p = .003, r^2 = .27; r (30) = .54, p = .002, r^2 = .29, respectively.

Does social problem-solving predict CP/CPPS symptoms?

In order to determine the necessity of incorporating demographic variables as covariates into the following regression models, Pearson product-moment correlations and a factorial ANOVA analysis were conducted to assess for relationships between demographics and

total NIH-CPSI score. No statistically significant correlations or differences between categorical variable groups were found on total CP/CPPS symptomatology. Therefore, there was no need to control for any of the demographic characteristics of the sample.

Daily Stress. Hierarchical multiple regression was employed to determine if social problem-solving significantly predicted CP/CPPS symptomatology above and beyond the variance already accounted for by daily stressful *experiences*. All formal assumptions of regression were assessed and determined to be satisfied. Consequently, no statistical corrections were required or attempted.

The regression model including only daily stressful experiences in block one (total SRLE) significantly predicted CP/CPPS symptomatology, $\Delta r^2 = .27$, $\Delta F (1, 28) = 10.52$, $p = .003$. When social problem-solving (total SPSI-R: S) was added to the model in block two, contrary to our hypothesis, there was no significant improvement in the prediction of CP/CPPS symptomatology, $\Delta r^2 = .07$, $\Delta F (1, 27) = 2.78$, $p = .107$. Consequently, daily stressful experiences but not social problem-solving ability emerged as a significant unique predictor of CP/CPPS symptomatology in this analysis, indicating that 27% of the variability in reported symptoms could be explained by the experience of daily stress, $b = .20$, $SE_b = .06$, *Beta* = .52, $t (28) = 3.24$, $p = .003$.

Perceived Stress. Similarly, a separate hierarchical multiple regression analysis was conducted to determine if social problem-solving significantly predicted CP/CPPS symptomatology above and beyond the variance already accounted for by *perceived* stress. Assumptions for this regression were verified and no violations were detected that required correction.

The regression model including only perceived stress in block one significantly predicted CP/CPPS symptomatology, Δ r^2 = .29, Δ F (1, 28) = 11.50, p = .002. When social problem-solving was added to the model in block two, there was a significant improvement in the prediction of CP/CPPS symptomatology, Δ r^2 = .11, Δ F (1, 27) = 5.04, p = .033. This suggest that approximately 11% of the variability in CP/CPPS symptomatology can be predicted independently by social problem-solving, above and beyond the variability already accounted for by perceived stress. Overall, greater than 40% of the variability in CP/CPPS symptomatology was predicted by the final full model, r^2 = .40, F (2, 27) = 9.10, p = .001.

When controlling for social problem-solving, perceived stress was a significant unique predictor of CP/CPPS symptomatology, b = .82, SE_b = .28, *Beta* = .46, t (27) = 3.00, p = .006. Conversely, when controlling for perceived stress, social problem-solving was a significant unique predictor of CP/CPPS symptomatology, b = -1.10, SE_b = .49, *Beta* = -.34, t (27) = -2.25, p = .033.

Does social problem-solving moderate the relationship between stress and CP/CPPS symptoms?

Daily Stress. A hierarchical linear regression analysis was utilized to determine if social problem-solving significantly moderated the relationship between daily stressful experiences and CP/CPPS symptomatology. The proposed moderator (total SPSI-R: S) and independent variable (total SRLE) were centered around their means, and the interaction term included in this analysis was computed using the centered versions of these variables. Once again, all assumptions associated with regression were determined to be satisfied upon inspection.

Results corresponding to blocks one and two of this regression were identical to those obtained above for the second hypothesis (daily stress). When the interaction term was added

in the third block of this model, prediction of CP/CPPS symptomatology did not significantly increase, Δ r^2 = .02, Δ F (1, 26) = 0.60, p = .448. Therefore, social problem-solving was not found to be a significant moderator of the relationship between daily stressful experiences and CP/CPPS symptomatology. Graph 1 (p. 62) depicts the nonsignificant interaction between daily stress and SPS to predict symptoms.

Perceived Stress. A final hierarchical linear regression analysis was employed to determine if social problem-solving significantly moderated the relationship between perceived stress and CP/CPPS symptomatology. The independent variable in this model (total PSS) was centered around its mean and the interaction term included in this analysis was computed using centered versions of the proposed moderator and independent variables. No violations of regression assumptions were indicated.

Results corresponding to blocks one and two of this regression were identical to those obtained above for the second hypothesis (perceived stress). When the interaction term was added in the third block of this model, prediction of CP/CPPS symptomatology did not significantly increase, Δ r^2 = .00, Δ F (1, 26) = 0.02, p = .884. Therefore, social problem-solving was not found to be a significant moderator of the relationship between perceived stress and CP/CPPS symptomatology as hypothesized. Graph 2 (p. 63) shows the nonsignificant interaction between perceived stress and SPS to predict symptoms.

CHAPTER 4: DISCUSSION

The set of correlational hypotheses were largely supported by the data, with the exception of the nonsignificance of the association between total social problem-solving and perceived stress. It is suspected that we did not find support for this relationship as a function of the small sample size analyzed. If the effect size of the relationship between SPS and PSS is small in this sample as indicated by our analyses (r^2 = .06), we are likely underpowered to detect its significance. Indeed, all correlational hypotheses that reached statistical significance had associated effect sizes that were in the medium to large range (r^2 *Range* = .17 – .42). Notably, one dimension of SPS, NPO, was significantly correlated with perceived stress, r (30) = .55, p = .002, r^2 = .30.

In accordance with the literature, both the perception and experience of daily stress evidenced positive relationships with CP/CPPS specific symptoms, indicating that males who report relatively more subjective and objective stress suffer from increased symptom frequency and severity. In the realm of objective daily stress experiences, dimensions of social/cultural difficulties (r (30) = .52, p = .003, r^2 = .27), work (r (30) = .47, p = .009, r^2 = .22), time pressure (r (30) = .39, p = .034, r^2 = .15), and social victimization (r (30) = .38, p = .041, r^2 = .14) demonstrated significant relationships with total symptoms for this sample. Conversely, social acceptability and finance related stressors were unrelated to CP/CPPS symptoms. The cross-sectional nature of this research does not allow for definitive conclusions regarding the direction of this relationship. Indeed, elevated stress levels may induce or exacerbate symptoms, or the presence of symptoms may induce or exacerbate stress. Based on the adapted diathesis-stress model of problem-solving for CP/CPPS, we posit that the association between stress and

symptoms is reciprocal, however, prospective studies must be conducted in order to confirm this hypothesis.

Importantly, social problem-solving ability was significantly related to the experience of aggregate symptoms in this sample of men coping with chronic pelvic pain, such that individuals with higher total scores on the SPSI-R: S enjoyed reduced frequency and severity of symptoms compared to their lower scoring counterparts. More specifically, total SPS evidenced negative associations with both the pain (r (30) = -.40, p = .030, r^2 = .16) and quality of life impact (r (30) = -.47, p = .009, r^2 = .22) subscales of the NIH-CPSI, but was not significantly correlated with urinary symptoms.

As the first investigation to measure social problem-solving in this population, these findings are encouraging and lend support to the theory that we may be successful in assuaging CP/CPPS symptomatology by bolstering social problem-solving ability with PST in these patients. Nevertheless, it is notable that the sample as a whole was characterized by more adaptive dimensions of SPS, specifically positive problem orientation and planful problem-solving, than dysfunctional aspects of SPS. A similar pattern of results regarding the relative strength of adaptive versus dysfunctional SPS dimensions was reported by Nezu, Nezu, and Jain (2008) in a sample of patients presenting with noncardiac chest pain. On the whole, the SPS skills of the participants in this sample does not appear to be especially deficient or dysfunctional. Regardless, both AS (r (30) = .40, p = .028, r^2 = .16) and ICS (r (30) = .39, p = .036, r^2 = .15) demonstrated significant, positive relationships with total symptomatology. Interestingly, AS was also significantly associated with the NIH-CPSI pain dimension (r (30) = .43, p = .017, r^2 = .18), while ICS was correlated with the urinary symptom dimension (r (30) = .40, p = .029, r^2 = .16). This suggests that males coping with chronic prostatitis who are also high on these

ineffective dimensions of SPS may constitute ideal candidates for PST, and that targeting specific types of dysfunctional SPS could potentially lead to improvements in specific CP/CPPS symptom domains.

In our first set of regression analyses, both perceived and daily stress were found to be significant predictors of CP/CPPS symptomatology. Support was found for SPS significantly predicting symptoms above and beyond perceived stress, but not above and beyond the experience of daily stress. Consequently, SPS accounts for a significant amount of the variance (11%) in symptomatology controlling for the variance already accounted for by perceived stress, but not daily stress. It is possible that SPS has a more pronounced influence on symptomatology in the context of perceived stress compared to the actual experience of daily stress. Once again, we were not sufficiently powered to conduct these analyses which may account for the discrepancy between our hypotheses and results.

Contrary to our final set of hypotheses, no support was found for social problem-solving as a significant moderator of either the daily stress experience – CP/CPPS symptom relationship or perceived stress – CP/CPPS symptom relationship. We anticipate significant results may emerge once we achieve adequate sample size, as the investigation is currently ongoing. In the event that SPS does not play a moderating role in these relationships, other potential moderators that can be targeted in psychotherapeutic treatment such as pain catastrophizing may be valuable directions for future research in this population.

Limitations

Limitations of the present study include its cross-sectional design, which prohibit any conclusions regarding causality or the nature of the direction of the relationships examined. This investigation exclusively employed a self-report, survey-based method of data collection and did

not formally consider additional data sources, such as observations of participant's physicians or significant others. Further, patients were recruited from geographically limited clinical sites in Maryland and Pennsylvania, potentially reducing the generalizability of the results obtained. A sufficient sample size was not achieved in order to test some of the more sophisticated hierarchical regression and moderation analyses proposed with adequate power. As a result, many hypotheses received partial or no support at the time of this report. Finally, type I error may have been inflated as a result of conducting multiple analyses without adjusting significance levels to account for familywise error.

Future Directions

Data collection for the present study is ongoing, with the goal of achieving a sample size sufficient to be powered for the statistical analyses associated with the second and third hypotheses. Considering that social problem-solving is a multidimensional construct, we hope to explore the utility of the various distinct components of SPS as predictors of CP/CPPS symptomatology and moderators of the stress – symptom association. This will reveal a more nuanced portrait of the role that SPS plays in patients coping with chronic pelvic pain beyond total social problem-solving ability alone. However, in the event that SPS is not found to be a significant moderator of the relationship between stress and CP/CPPS symptoms, future research should continue to explore other potential moderators that can serve as promising treatment targets for psychosocial intervention in this population. The adapted diathesis-stress model of problem-solving for CP/CPPS presented in this investigation includes a "neurobiological reactions" component, however, biomarkers of a dysfunctional stress response (i.e. cortisol and ACTH activity) were not measured in this study. Our understanding of the multifactorial exchange between biological, psychological, and environmental factors in chronic prostatitis will

undoubtedly evolve as principles of psychoneuroimmunology are incorporated into this research. Particularly interesting is the prospect of examining pertinent stress-related biomarkers prior to and after the implementation of a psychotherapeutic protocol such as PST as one aspect of treatment outcome. Finally, based on the program preferences of the sample analyzed, including components of biofeedback in interventions designed for CP/CPPS patients to learn how to relax the body will likely increase perceived patient credibility and buy-in for psychosocial treatment options among these men.

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Appendix A: Tables and Figures of Results

A1. *Table 1*

Demographic Characteristics

Age	*M* (*S.D.*): 47.9 (15.2)
Symptom Duration (months)	*M (S.D.)*: 114.4 (150.0)
Race	White: 83.3% (*n* = 25) Black/African American: 13.3% (*n* = 4) Asian: 3.3% (*n* = 1)
Ethnicity	Not Hispanic or Latino: 100% (*n* = 30)
Relationship Status	Married/living with a partner: 80% (*n* = 24) Never married/not living with a partner: 13.3% (*n* = 4) Divorced/Separated: 6.7% (*n* = 2)
Children	Have children: 66.7% (*n* = 20) Do not have children: 33.3% (*n* = 10) Number of children *M* (*S.D.*): 1.63 (1.43)
Education	Graduate education (Master's/Doctorate): 44.8% (*n* = 13) College degree (Associate's/Bachelor's): 34.5% (*n* = 10) Some college: 17.2% (*n* = 5) High school diploma: 3.4% (*n* = 1)
Income	More than $100,000: 76.7% (*n* = 23) $80,000 – $99,999: 6.7% (*n* = 2) $60,000 – $79,999: 6.7% (*n* = 2) $40,000 – $59,999: 6.7% (*n* = 2) $20,000 – $39,999: 3.3% (*n* = 1)
Employment Status	Working full-time: 66.7% (*n* = 20) Retired: 20% (*n* = 6) Working part-time: 10% (*n* = 3) Disabled/unable to work: 3.3% (*n* = 1)

Table 1 (continued)

Alcohol Use	0-3 days/month: 40% (*n* = 12) 2 days/week: 16.7% (*n* = 5) 1 day/week: 13.3% (*n* = 4) 3 days/week: 10% (*n* = 3) 4 days/week: 6.7% (*n* = 2) Never: 6.7% (*n* = 2) 6 days/week: 3.3% (*n* = 1) 7 days/week: 3.3% (*n* = 1)
Tobacco Use	Used in the past, but successfully quit: 50% (*n* = 15) Never smoked/used tobacco products: 43.3% (*n* = 13) Currently smoke/use other tobacco products occasionally: 6.7% (*n* = 2)
Psychotherapy Use	Never: 60% (*n* = 18) More than 1 year ago: 16.7% (*n* = 5) Within the past month: 13.3% (*n* = 4) Within the past 3 months: 6.7% (*n* = 2) Within the past year: 3.3% (*n* = 1)
Psychotropic Medication Use	Never: 36.7% (*n* = 11) More than 1 year ago: 26.7% (*n* = 8) Within the past month: 20% (*n* = 6) Within the past 3 months: 10% (*n* = 3) Within the past year: 3.3% (*n* = 1) Don't remember/Not Sure: 3.3% (*n* = 1)

Note. N = 30 except for "Education", where *N* = 29 due to missing data for 1 participant.

A2. ***Table 2***

Descriptive Statistics and Intercorrelations Matrix for Major Study Variables

N = 30	**1.**	**2.**	**3.**	**4.**
1. CP/CPPS Symptoms (NIH-CPSI Total Score)				
2. Social Problem-Solving (SPSI: R – S Total Score)	-.45, *p* = .012*			
3. Daily Stress (SRLE Total Score)	.52, *p* = .003**	-.41, *p* = .025*		
4. Perceived Stress (PSS)	.54, *p* = .002**	-.24, *p* = .212 (*ns*)	.65, *p* < .001**	
Mean (SD)	18.20 (7.62)	13.65 (2.38)	84.29 (19.57)	29.73 (4.24)

Note: * *p* < .05 (*2-tailed*); ** *p* < .01 (*2-tailed*)

A3. ***Table 3***

Interests and Preferences for CP/CPPS Stress Management Programs

General Interest	Somewhat interested: 33% (*n* = 10) Not very interested: 23.3% (*n* = 7) Neutral/no preference: 20% (*n* = 6) Very interested: 13.3% (*n* = 4) Not at all interested: 10% (*n* = 3)
Structure Preference	Individually, in person: 43.3% (*n* = 13) Individually, over the phone: 23.3% (*n* = 7) No preference: 20% (*n* = 6) Together in a group with other men diagnosed with CP/CPPS: 10% (*n* = 3) Together with a partner/family member/friend: 3.3% (*n* = 1)
Length Preference	No preference: 60% (*n* = 18) 5 meetings (weeks): 26.7% (*n* = 8) 6 meetings (weeks): 6.7% (*n* = 2) 8 meetings (weeks): 6.7% (*n* = 2)
Specific Interests	Relax your body: 70% (*n* = 21) Think healthier: 53.3% (*n* = 16) Cope with/manage negative emotions: 50% (*n* = 15) Feel more in control under stress: 36.7% (*n* = 11) Solve life problems effectively: 30% (*n* = 9) No specific interests indicated: 6.7% (*n* = 2) Other: 9.9% (*n* = 3) Appetite control under stress: 3.3% (*n* = 1) Healthy eating choices: 3.3% (*n* = 1) Cope with pain/discomfort: 3.3% (*n* = 1)

Table 3 (continued)

Barriers	Not willing/able to fulfill time commitment: 50% (*n* = 15) Already manage stress effectively: 30% (*n* = 9) No barriers indicated: 16.7% (*n* = 5) Difficult to talk about problems: 10% (*n* = 3) Not under stress: 6.7% (*n* = 2) Would rather take medication to manage stress: 3.3% (*n* = 1) Other: 9.9% (*n* = 3) Cost: 3.3% (*n* = 1) Depends when and where: 3.3% (*n* = 1) Must not conflict with my psychiatric treatment: 3.3% (*n* = 1)

A4. *Table 4*

Expanded Intercorrelations Matrix Including Subscale Scores

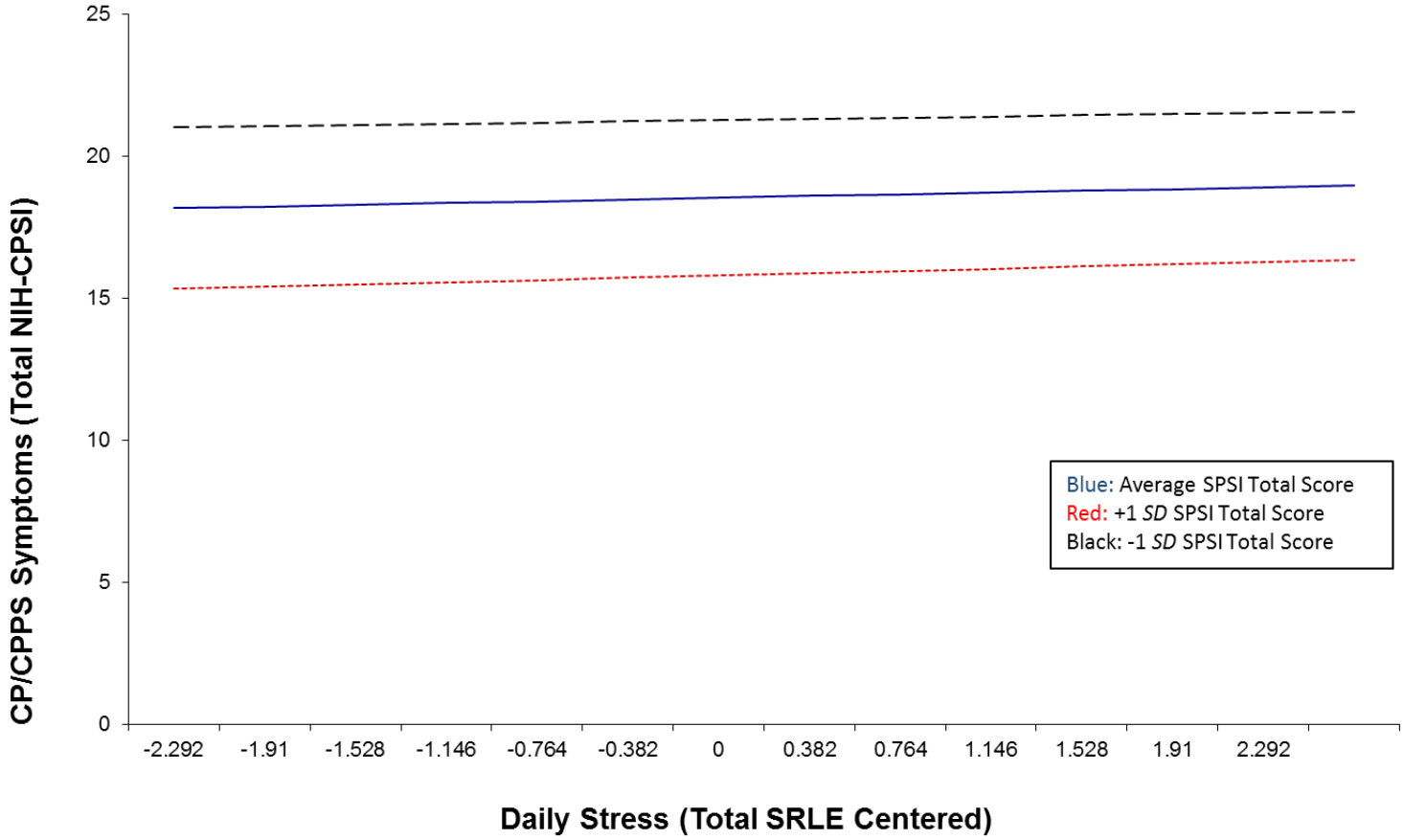
N = 30	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. NIH-CPSI: Total																	
2. NIH-CPSI: Pain	.91, *p* < .001**																
3. NIH-CPSI: Urinary	.52, *p* = .003**	.21, *p* = .275 (*ns*)															
4. NIH-CPSI: QoL Impact	.87, *p* < .001**	.77, *p* < .001**	.19, *p* = .307 (*ns*)														
5. SPSI:R –S: Total	-.45, *p* = .012*	-.40, *p* = .030*	-.16, *p* = .387 (*ns*)	-.47, *p* = .009**													
6. SPSI:R –S: PPO	-.08, *p* = .660 (*ns*)	-.13, *p* = .486 (*ns*)	.18, *p* = .330 (*ns*)	-.19, *p* = .315 (*ns*)	.65, *p* < .001**												
7. SPSI:R – S: NPO	.34, *p* = .069 (*ns*)	.26, *p* = .167 (*ns*)	.13, *p* = .487 (*ns*)	.39, *p* = .031*	-.70, *p* < .001**	-.58, *p* = .001**											
8. SPSI:R – S: PPS	-.20, *p* = .286 (*ns*)	-.14, *p* = .452 (*ns*)	-.12, *p* = .521 (*ns*)	-.22, *p* = .252 (*ns*)	.49, *p* = .007**	.27, *p* = .148 (*ns*)	.08, *p* = .666 (*ns*)										
9. SPSI:R – S: ICS	.39, *p* = .036*	.25, *p* = .186 (*ns*)	.40, *p* = .029*	.30, *p* = .102 (*ns*)	-.55, *p* = .002**	.09, *p* = .636 (*ns*)	.11, *p* = .577 (*ns*)	-.44, *p* = .015*									

Note: * $p < .05$ (*2-tailed*); ** $p < .01$ (*2-tailed*); *ns* refers to a nonsignificant result at the $p < .05$ level.

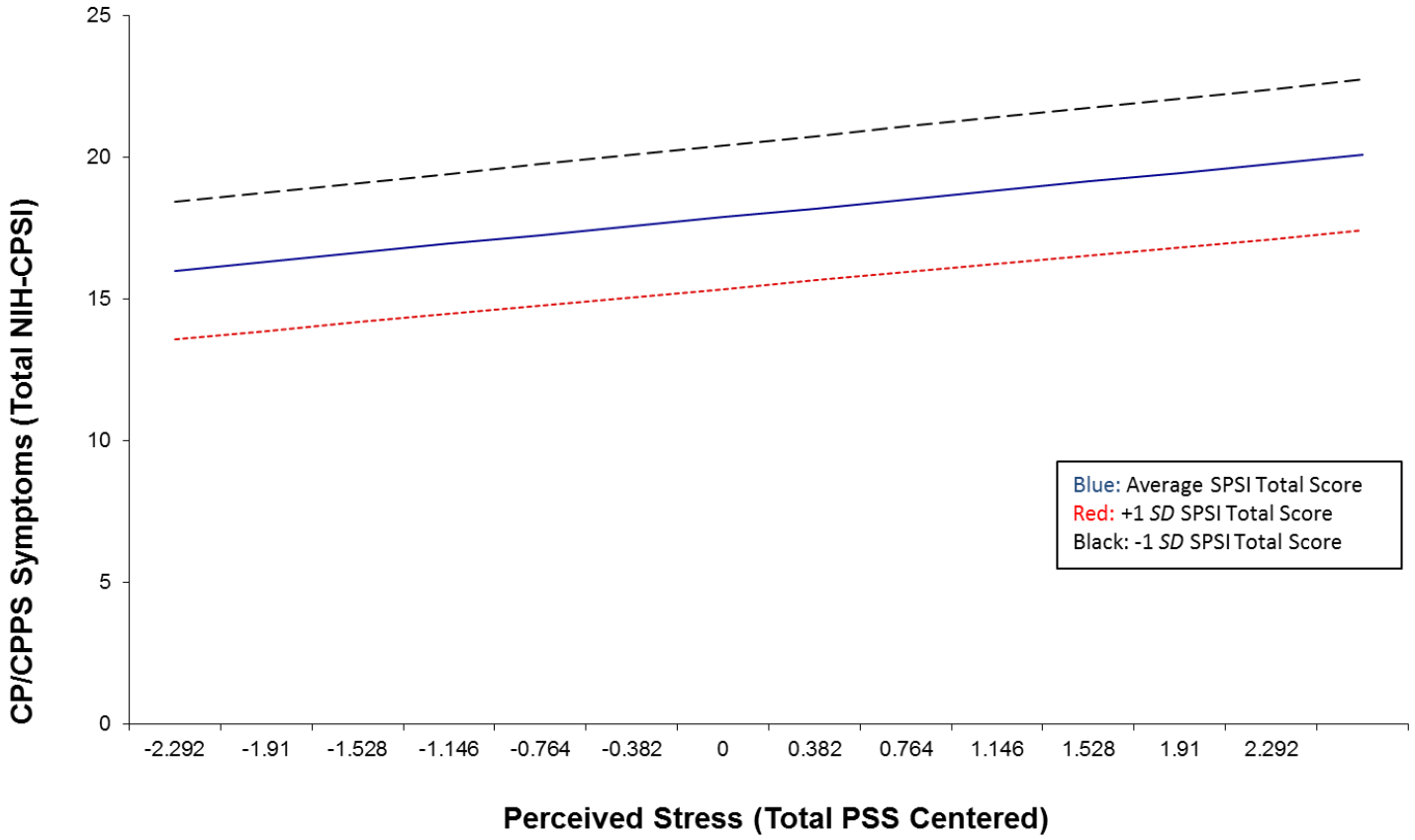
Table 4 (continued)

N = 30	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
10. SPSI:R – S: AS	.40, *p* = .028*	.43, *p* = .017*	.08, *p* = .686 (*ns*)	.37, *p* = .047*	-.77, *p* < .001**	-.30, *p* = .107 (*ns*)	.48, *p* = .008**	-.12, *p* = .543 (*ns*)	.40, *p* = .027*								
11. SRLE: Total	.52, *p* = .003**	.51, *p* = .004**	.20, *p* = .287 (*ns*)	.47, *p* = .010**	-.41, *p* = .025*	-.34, *p* = .070 (*ns*)	.62, *p* < .001**	.16, *p* = .393 (*ns*)	-.06, *p* = .765 (*ns*)	.41, *p* = .024*							
12. SRLE: Work	.47, *p* = .009**	.46, *p* = .010**	.26, *p* = .160 (*ns*)	.34, p = .064 (*ns*)	-.19, *p* = .316 (*ns*)	.01, *p* = .969 (*ns*)	.19, *p* = .324 (*ns*)	.01, *p* = .963 (*ns*)	.02, *p* = .933 (*ns*)	.33, *p* = .072 (*ns*)	.63, *p* < .001**						
13. SRLE: Time Pressure	.39, *p* = .034*	.39, *p* = .036 *	.10, *p* = .596 (*ns*)	.38, *p* = .038*	-.20, *p* = .284 (*ns*)	-.18, *p* = .332 (*ns*)	.44, *p* = .015*	.26, *p* = .175 (*ns*)	-.12, *p* = .534 (*ns*)	.26, *p* = .169 (*ns*)	.89, *p* < .001**	.46, *p* = .010*					
14. SRLE: Social Acceptability	.25, *p* = .191 (*ns*)	.20, *p* = .297 (*ns*)	.10, *p* = .608 (*ns*)	.27, *p* = .142 (*ns*)	-.29, *p* = .122 (*ns*)	-.44, *p* = .015*	.65, *p* < .001**	.34, *p* = .063 (*ns*)	-.30, *p* = .104 (*ns*)	.29, *p* = .119 (*ns*)	.84, *p* < .001**	.35, *p* = .056 (*ns*)	.79, *p* < .001**				
15. SRLE: Social Victimization	.38, *p* = .041*	.37, *p* = .045*	.20, *p* = .296 (*ns*)	.29, *p* = .127 (*ns*)	-.25, *p* = .186 (*ns*)	-.23, *p* = .217 (*ns*)	.47, *p* = .009**	.16, *p* = .402 (*ns*)	-.08, *p* = .664 (*ns*)	.22, *p* = .243 (*ns*)	.70, *p* < .001**	.51, *p* = .004**	.56, *p* = .001**	.56, *p* = .001**			
16. SRLE: Finances	.23, *p* = .227 (*ns*)	.33, *p* = .076 (*ns*)	-.09, *p* = .634 (*ns*)	.21, *p* = .276 (*ns*)	-.12, *p* = .534 (*ns*)	-.33, *p* = .075 (*ns*)	.35, *p* = .059 (*ns*)	.26, *p* = .161 (*ns*)	-.27, *p* = .152 (*ns*)	.12, *p* = .525 (*ns*)	.62, *p* < .001**	.17, *p* = .358 (*ns*)	.48, *p* = .008**	.59, *p* = .001**	.23, *p* = .213 (*ns*)		
17. SRLE: Social Cultural	.52, *p* = .003**	.50, *p* = .005**	.27, *p* = .148 (*ns*)	.41, *p* = .025*	-.62, *p* < .001**	-.33, *p* = .078 (*ns*)	.48, *p* = .008**	-.35, *p* = .057 (*ns*)	.37, *p* = .044*	.43, *p* = .017*	.57, *p* = .001**	.13, *p* = .512 (*ns*)	.40, *p* = .031*	.28, *p* = .132 (*ns*)	.38, *p* = .041*	.34, *p* = .064 (*ns*)	
18. PSS: Total	.54, *p* = .002**	.41, *p* = .023*	.38, *p* = .039*	.49, *p* = .006**	-.24, *p* = .212 (*ns*)	-.17, *p* = .362 (*ns*)	.55, *p* = .002**	.17, *p* = .365 (*ns*)	-.08, *p* = .676 (*ns*)	.16, *p* = .403 (*ns*)	.65, *p* < .001**	.50, *p* = .005**	.52, *p* = .004**	.50, *p* = .005**	.58, *p* = .001**	.41, *p* = .024*	.30, *p* = .105 (*ns*)

Note: * $p < .05$ (*2-tailed*); ** $p < .01$ (*2-tailed*); *ns* refers to a nonsignificant result at the $p < .05$ level.



A5. ***Graph 1*** *Interaction of Social Problem-Solving and Daily Stress*



A6. ***Graph 2*** *Interaction of Social Problem-Solving and Perceived Stress*

Appendix B: Measures

B1. ***Stress and CP/CPPS Demographic Questionnaire***

ID #: _____ Date: _____
RA Initials: _____

Stress and CP/CPPS Demographic Questionnaire

Instructions: Please provide the following information. Remember that all of the information you provide below will be kept *confidential*. DO NOT write your name on this questionnaire.

1. **What is your current age?** _____

2. **What is your race?** *(Check all that apply.)*
   - ☐ White
   - ☐ Black or African American
   - ☐ American Indian or Alaska Native
   - ☐ Asian
   - ☐ Native Hawaiian or Other Pacific Islander
   - ☐ Multiracial
   - ☐ Other: _____

3. **What is your ethnicity?**
   - ☐ Hispanic or Latino
   - ☐ Not Hispanic or Latino

4. **What is your relationship status?**
   - ☐ Married or living with a partner
   - ☐ Divorced/Separated
   - ☐ Widowed
   - ☐ Never married and not living with a partner
   - ☐ Never married and not living with a partner, but in a committed relationship

5. **If you are currently married, living with a partner, or in a committed relationship, how long have you been with your partner?**

   _____

   Please indicate if you are referring to years, months, and/or weeks.

6. **Do you have children?**
   - ☐ Yes
   - ☐ No

7. **If so, how many children do you have?** _____

8. **What is the highest grade that you have completed in school?**
   - ☐ Some high school
   - ☐ High school diploma
   - ☐ Some college
   - ☐ College degree (Associate's or Bachelor's)
   - ☐ Graduate education (Master's or Doctorate)

9. **What is your estimated annual household income?**
   - ☐ < $20,000
   - ☐ $20,000 – $39, 999
   - ☐ $40,000 – $59, 999
   - ☐ $60, 000 – $79, 999
   - ☐ $80, 000 – $99, 999
   - ☐ > $100,000

10. **What is your current employment status?**
    - ☐ Working full-time
    - ☐ Working part-time
    - ☐ Unemployed, seeking work
    - ☐ Volunteer
    - ☐ Retired
    - ☐ Disabled/unable to work
    - ☐ Student

11. Have you ever smoked or used other tobacco products?

- ☐ Currently smoke or use other tobacco products daily
- ☐ Currently smoke or use other tobacco products occasionally
- ☐ Currently use daily, but trying to quit
- ☐ Used in the past, but successfully quit
- ☐ Never smoked or used tobacco products

12. How often do you drink alcohol (any amount)?

- ☐ Never
- ☐ 0-3 days/month
- ☐ 1 day/week
- ☐ 2 days/week
- ☐ 3 days/week
- ☐ 4 days/week
- ☐ 5 days/week
- ☐ 6 days/week
- ☐ 7 days/week

13. On average, how many alcoholic drinks do you drink in a typical week?_____

14. When were you first diagnosed with Chronic Prostatitis or Chronic Pelvic Pain Syndrome (CP/CPPS)? _____/_____/_____

Please respond in this format: mm/dd/yyyy. If you can't remember the exact date, provide an approximate date.

15. Have you been experiencing persistent pain in the pelvic region for at least the past 3 months? If "Yes", skip to item 17.

- ☐ Yes
- ☐ No

16. If you have NOT been experiencing persistent pain in the pelvic region for at least the past 3 months, when was the last time you experienced persistent pain in the pelvic region?

- ☐ Between 3 months and less than 6 months ago
- ☐ Between 6 months and less than 1 year ago
- ☐ Between 1 year and less than 2 years ago
- ☐ 2 or more years ago

17. How long have you had pain in the pelvic region, lower urinary tract symptoms, and/or sexual dysfunction symptoms related to your CP/CPPS?

_____

Please indicate if you are referring to years, months, and/or weeks.

18. How recently have you had any of the following treatments for emotional problems such as anxiety or depression?

Therapy:

- ☐ Never
- ☐ Within the past month
- ☐ Within the past 3 months
- ☐ Within the past year
- ☐ More than 1 year ago
- ☐ Don't remember/not sure

Medication:

- ☐ Never
- ☐ Within the past month
- ☐ Within the past 3 months
- ☐ Within the past year
- ☐ More than 1 year ago
- ☐ Don't remember/not sure

19. Please list any other major medical diagnoses you currently have or have a history of:

_____

_____

_____

_____

20. How interested would you be in participating in a weekly stress management program designed for men diagnosed with CP/CPPS?

- ☐ Not at all interested
- ☐ Not very interested
- ☐ Neutral/no preference
- ☐ Somewhat interested
- ☐ Very interested

21. What is your preference for the structure of such a stress management program?

- ☐ Individually or “one-on-one”, in person
- ☐ Individually or “one-on-one”, over the phone
- ☐ Together with a partner, family member, or friend
- ☐ Together in a group with other men diagnosed with CP/CPPS
- ☐ No preference

22. What is your preference for the length of such a stress management program?

- ☐ 5 meetings (weeks)
- ☐ 6 meetings (weeks)
- ☐ 7 meetings (weeks)
- ☐ 8 meetings (weeks)
- ☐ No preference

23. What would you be interested in learning from such a stress management program? *(Check all that apply.)*

- ☐ How to solve life problems more effectively
- ☐ How to cope with and manage negative emotions
- ☐ How to relax your body
- ☐ How to think healthier
- ☐ How to feel more in control when under stress
- ☐ Other:

_____

_____

24. What would prevent you from participating in such a stress management program? *(Check all that apply.)*

- ☐ I am not under stress.
- ☐ I feel I already manage my stress effectively.
- ☐ I am not willing and/or able to fulfill the time commitment.
- ☐ I would rather take medication to manage my stress.
- ☐ I find it difficult to talk about my problems.
- ☐ Other:

_____

_____

B2. ***National Institutes of Health – Chronic Prostatitis Symptom Inventory (NIH-CPSI)***

ID #: _____ Date: _____
RA Initials: _____

NIH-CPSI

Pain or Discomfort

1. In the last week, have you experienced any pain or discomfort in the following areas?

	Yes	No
a. Area between rectum and testicles (perineum)	☐	☐
b. Testicles	☐	☐
c. Tip of the penis (not related to urination)	☐	☐
d. Below your waist, in your pubic or bladder area	☐	☐

2. In the last week, have you experienced:

	Yes	No
a. Pain or burning during urination?	☐	☐
b. Pain or discomfort during or after sexual climax (ejaculation)?	☐	☐

3. How often have you had pain or discomfort in any of these areas over the last week?

☐ Never
☐ Rarely
☐ Sometimes
☐ Often
☐ Usually
☐ Always

4. Which number best describes your AVERAGE pain or discomfort on the days that you had it, over the last week?

0 1 2 3 4 5 6 7 8 9 10

NO PAIN PAIN AS BAD AS YOU CAN IMAGINE

Urination

5. How often have you had a sensation of not emptying your bladder completely after you finished urinating, over the last week?

- ☐ Not at all
- ☐ Less than 1 time in 5
- ☐ Less than half the time
- ☐ About half the time
- ☐ More than half the time
- ☐ Almost always

6. How often have you had to urinate again less than two hours after you finished urinating, over the last week?

- ☐ Not at all
- ☐ Less than 1 time in 5
- ☐ Less than half the time
- ☐ About half the time
- ☐ More than half the time
- ☐ Almost always

Impact of Symptoms

7. How much have your symptoms kept you from doing the kinds of things you would usually do, over the last week?

   ☐ None
   ☐ Only a little
   ☐ Some
   ☐ A lot

8. How much did you think about your symptoms, over the last week?

   ☐ None
   ☐ Only a little
   ☐ Some
   ☐ A lot

Quality of Life

9. If you were to spend the rest of your life with your symptoms just the way they have been during the last week, how would you feel about that?

   ☐ Delighted
   ☐ Pleased
   ☐ Mostly satisfied
   ☐ Mixed (about equally satisfied and dissatisfied)
   ☐ Mostly dissatisfied
   ☐ Unhappy
   ☐ Terrible

Reference:

Litwin, M., McNaughton-Collins, M., Fowler, F.J. Jr., Nickel, J. C., Calhoun, E. A., Pontari, M. A., Alexander, R. B., Farrar, J. T., & O'Leary, M. P. (1999). The National Institutes of Health chronic prostatitis symptom index: Development and validation of a new outcome measure. *Journal of Urology, 162*(2), 369-375.

B3. ***Survey of Recent Life Experiences Scale (SRLE)***

ID #: _____ Date: _____
RA Initials: _____

SRLE

Instructions: Following is a list of experiences which many people have some time or other. Please indicate for each experience how much it has been a part of your life *over the past month*. Circle "1" next to an experience if it was *not at all* part of your life over the past month; "2" for an experience which was *only slightly* part of your life over that time; "3" for an experience which was *distinctly* part of your life and "4" for an experience which was *very much* part of your life over the past month.

Intensity of Experience over Past Month

1 = *Not at all* part of my life
2 = *Only slightly* part of my life
3 = *Distinctly* part of my life
4 = *Very much* part of my life

1. Disliking your daily activities

   1 2 3 4

2. Lack of privacy

   1 2 3 4

3. Disliking your work

   1 2 3 4

4. Ethnic or racial conflict

   1 2 3 4

5. Conflicts with in-laws or boyfriend's/girlfriend's family

   1 2 3 4

6. Being let down or disappointed by friends

   1 2 3 4

7. Conflict with supervisor(s) at work

1	2	3	4
Not at all	*Only slightly*	*Distinctly*	*Very much*

8. Social rejection

1	2	3	4

9. Too many things to do at once

1	2	3	4

10. Being taken for granted

1	2	3	4

11. Financial conflicts with family members

1	2	3	4

12. Have your trust betrayed by a friend

1	2	3	4

13. Separation from people you care about

1	2	3	4

14. Having your contributions overlooked

1	2	3	4

15. Struggling to meet your own standards of performance and accomplishment

1	2	3	4

16. Being taken advantage of

1	2	3	4

17. Not enough leisure time

1	2	3	4

18. Financial conflicts with friends or fellow workers

1	2	3	4
Not at all	*Only slightly*	*Distinctly*	*Very much*

19. Struggling to meet other people's standards of performance and accomplishment

1	2	3	4

20. Having your actions misunderstood by others

1	2	3	4

21. Cash-flow difficulties

1	2	3	4

22. A lot of responsibilities

1	2	3	4

23. Dissatisfaction with work

1	2	3	4

24. Decision about intimate relationship(s)

1	2	3	4

25. Not enough time to meet your obligations

1	2	3	4

26. Dissatisfaction with your mathematical ability

1	2	3	4

27. Financial burdens

1	2	3	4

28. Lower evaluation of your work than you think you deserve

1	2	3	4

29. Experiencing high levels of noise

1	2	3	4
Not at all	*Only slightly*	*Distinctly*	*Very much*

30. Adjustments to living with unrelated person(s) (e.g., roommate)

1	2	3	4

31. Lower evaluation of your work than you hoped for

1	2	3	4

32. Conflicts with family member(s)

1	2	3	4

33. Finding your work too demanding

1	2	3	4

34. Conflicts with friend(s)

1	2	3	4

35. Hard effort to get ahead

1	2	3	4

36. Trying to secure loan(s)

1	2	3	4

37. Getting “ripped off” or cheated in the purchase of goods

1	2	3	4

38. Dissatisfaction with your ability at written expression

1	2	3	4

39. Unwanted interruptions of your work

1	2	3	4

40. Social isolation

1	2	3	4
Not at all	*Only slightly*	*Distinctly*	*Very much*

41. Being ignored

1	2	3	4

42. Dissatisfaction with your physical appearance

1	2	3	4

43. Unsatisfactory housing conditions

1	2	3	4

44. Finding work uninteresting

1	2	3	4

45. Failing to get money you expected

1	2	3	4

46. Gossip about someone you care about

1	2	3	4

47. Dissatisfaction with your physical fitness

1	2	3	4

48. Gossip about yourself

1	2	3	4

49. Difficulty dealing with modern technology (e.g. computers)

1	2	3	4

50. Car problems

1	2	3	4

51. Hard work to look after and maintain home

1	2	3	4
Not at all	*Only slightly*	*Distinctly*	*Very much*

Reference:

Kohn, P. M. & Macdonald, J. E. (1992). The survey of recent life experiences: A decontaminated hassles scale for adults. *Journal of Behavioral Medicine, 15*(2), 221-236.

B4. ***Perceived Stress Scale (PSS)***

ID #: _____ Date: _____
RA Initials: _____

PSS

Instructions: The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate *how often* you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate. For each question choose from the following alternatives:

0	1	2	3	4
Never	*Almost Never*	*Sometimes*	*Fairly Often*	*Very Often*

1. In the last month, how often have you been upset because of something that happened unexpectedly?

   0 1 2 3 4

2. In the last month, how often have you felt that you were unable to control the important things in your life?

   0 1 2 3 4

3. In the last month, how often have you felt nervous and "stressed"?

   0 1 2 3 4

4. In the last month, how often have you dealt successfully with irritating life hassles?

   0 1 2 3 4

5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?

   0 1 2 3 4

6. In the last month, how often have you felt confident about your ability to handle your personal problems?

   0 1 2 3 4

7. In the last month, how often have you felt that things were going your way?

0	1	2	3	4
Never	*Almost Never*	*Sometimes*	*Fairly Often*	*Very Often*

8. In the last month, how often have you found that you could not cope with all the things that you had to do?

0	1	2	3	4

9. In the last month, how often have you been able to control irritations in your life?

0	1	2	3	4

10. In the last month, how often have you felt that you were on top of things?

0	1	2	3	4

11. In the last month, how often have you been angered because of things that happened that were outside of your control?

0	1	2	3	4

12. In the last month, how often have you found yourself thinking about things that you have to accomplish?

0	1	2	3	4

13. In the last month, how often have you been able to control the way you spend your time?

0	1	2	3	4

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

0	1	2	3	4

Reference:

Cohen, S., Kamarack, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*(4), 385-396.